Pests

AND THEIR CONTROL

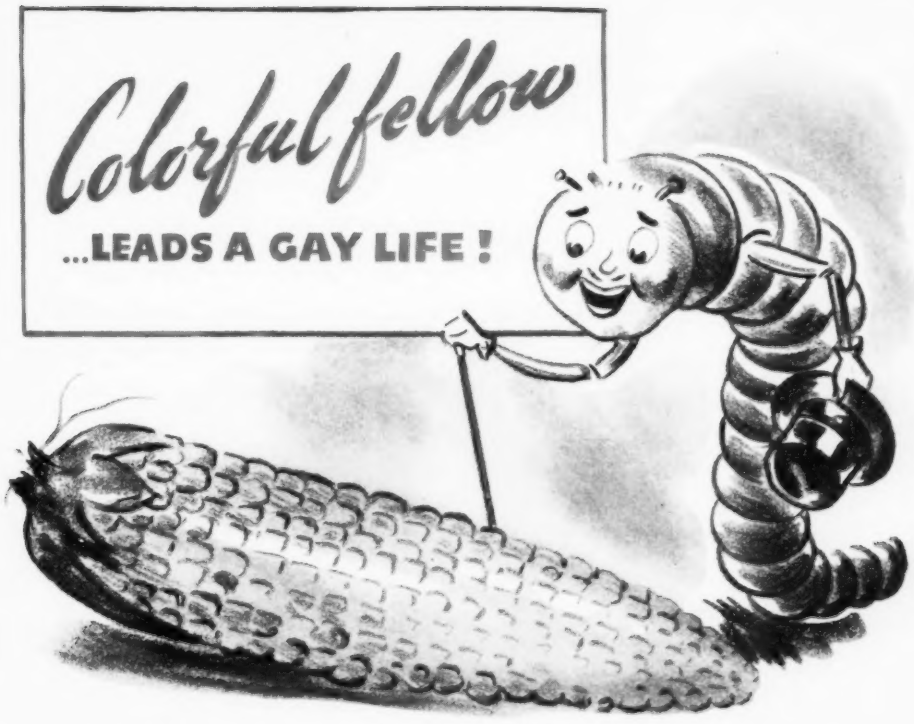
1943

MARCH

VOL. 11 NO. 3

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.



Control Him with "CYANEGG"— HCN FUMIGATION

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For egg, he dons a pearly white; for larva, sports a pink costume, with head and shoulders brown. Right here, all dressed for food destruction and contamination, he burrows into a kernel of grain or corn to await new raiment — eventually emerges winged in yellow, reddish brown and black.

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. It can be generated economically from "Cyanegg." Your nearest "Cyanegg" distributor can give you detailed information.

E. I. du Pont de Nemours & Co., (Inc.), Electrochemicals Department, Wilmington, Delaware.

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HOW THE PROFESSIONAL EXTERMINATOR CAN HELP TO WIN THE WAR

Wars may come and wars may go but there never can be an armistice in the war to keep the home front safe from disease and infestation. Neither bottlenecks, nor priorities, nor scarcities, nor the heavy new problems brought on by huge concentrations of men and machines dare call a halt in the work of the professional exterminator. Today, more than in peacetime even, he truly is the indispensable soldier behind the lines.

Are materials scarce? Use the best you can get, and make every ounce of killing power do its wasteless most. *Is labor hard to get?* Increase your efficiency of operation to the utmost. *Are prices higher than before the war?* Look ahead to the day of peace when, by holding fast to the ideal of quality throughout these trying times, you will have the foundation for a greater, more rewarding era of prosperity.

Are conditions tough? Sure they are! For you, for us—and above all for our boys on the far-flung battlefields of this global war.

Do your best. We'll do ours. Together, we will lay the groundwork for the better times that are surely ahead.

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Pests

and Their **CONTROL**

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

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Three classes of membership: Active, Associated and Allied. ACTIVE MEMBERSHIP includes all firms engaged in any type of Pest Control operations (general extermination, fumigation, termite control, moth proofing) and dues are $15.00 per year. ASSOCIATE MEMBERSHIP includes branch offices of Active members and yearly dues are $10.00. ALLIED MEMBERSHIP includes manufacturers and supply houses.

STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

For further details, communicate with
WILLIAM O. BUETTNER, Secretary
3019 Fort Hamilton Parkway **Brooklyn, New York**

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EDITORIAL

Manpower

RECENT rulings and press releases by the War Manpower Commission have, because of their portents, actual and implied, been of definitive interest to the PCO and his personnel.

Since the Technical Committee of the War Manpower Commission "undertakes to determine those activities which may be considered of such importance to war production and the support of the war effort that critical occupations within those activities may receive consideration for occupational deferment from military service," NPCA officials have conferred with the "Committee" on the question of the Industry's essential position in this effort. Members of the NPCA have, of course, been kept informed of the nature of these meetings through their Service Letters.

By the time this issue reaches the reader, a hearing before a sub-committee of the Technical Committee of the War Manpower Commission, with President F. E. Bohman, Past-President Walter S. McCloud and Secretary W. O. Buettner representing the PCI, was to be held on March 3rd at Washington, to discuss consideration to be given the Industry in regard to deferment because of its essential nature.

The case for the Industry is based in part on the fact that "personnel of the Industry cannot be trained overnight since the handling of deadly fumigants and toxic substances in the elimination and control of insects and rodents demand practical and scientific experience in order to perform efficacious services."

Of proximate interest (and with kind permission of the NPCA) we reprint, from service letter 278, briefed views of plant managers, health officers, entomologists, housing officials and officers of the Armed Forces apropos importance of the Industry:

(a)—Our Pest Control Industry is definitely a second line in defense of public health.
(b)—Our Pest Control Industry must protect every manner of commodity from damage and destruction.
(c)—Our Pest Control Industry must preserve structures themselves from insect attack.
(d)—Our Pest Control Industry must fumigate many vessels that are infested with vermin.
(e)—Federally, the fumigation of vessels is respected by the U. S. Public Health Service Quarantine Stations when conducted by competent fumigators.
(f)—In many cities only a licensed fumigator can perform such work with the exception of certain government officials.
(g)—Our Pest Control Industry by virtue of legislation that prevails in many cities and several states is solely charged with engaging in the profession of Pest Control. Indeed the Pest Control Operator must qualify by examination before he is issued a license to do pest control work.

As of supplementary interest, particularized recognition by Governmental agencies with respect to the Industry's needs, also part of Service Letter No. 278, is here reprinted:

1—Supplemental gasoline rationing has been provided as per the revised regulations "Mileage Rationing: Gasoline Regulations" Ration order No. 5C. These regulations also consider tires.
2—Chemicals on critical lists and on allocation are not entirely denied our pest control industry. Pyrethrum, for example, for which there are many uses that indicate its value, finds our industry considered high on the list for consideration and we are receiving a fair percentage.
3—Equipment is being given a high priority rating as such is shown to be necessary if work is to be properly done.
4—The Armed Forces have indicated that a degree of consideration will be given by way of assignment of personnel to the Sanitary Corps as well as the Pest Control Industry performing such services at the various Army and Navy bases.

The list of occupations thus far issued does not include the PCO, which may be interpreted to mean, even if only by indirection, the essentiality of the Industry, so that employees should not change positions. Despite the foregoing a note of caution, against overoptimism, relative to the over-all picture of Industry deferment, is in order.

Co-Operation of Public Health Department and PCO Essential in Rat Control

TO INSURE adequate war-food production, the U. S. D. A. has embarked on a campaign to marshal public participation in its program of 18,000,000 Victory Gardens. To avoid loss of man-hours, due to sickness and accident, in war production, the National Safety Council is engaged in a nation-wide campaign to minimize both in the factory and the home. To implement these drives, the Memphis Health Department, conscious of its responsibility to protect the health of its citizens, of the need to minimize food wastage due to rat depredations, of the fact that baiting, gassing and trapping are only one facet of rat control, is conducting a campaign to educate the public on the necessity of co-operating in its rat-control program, lacking which the program must prove ineffectual.

The public-spirited "Commercial Appeal," of Memphis, in a lead editorial headed "Declare War on Rats," clarions for a city wide and carefully coordinated fight against the rats. Similar in essence is a feature article, in the same paper, by Miss Emory Grinnel who gives the Industry a well-merited nod, and quotes Health Department estimates to the effect that the rat consumes $2 worth of edibles each year and destroys ten times that figure, and U. S. Department of Health figures which show typhus cases are on the increase over the Nation, with 2,787 cases in 1941 and 3,419 in 1942. Also outlined in her article, here reproduced, is a 9-point program of public co-operation, advocated by the Health Department.

1. A general cleaning and disposal of all trash, rubbish, unused lumber on premises.
2. Stack all lumber and stove wood at least two feet above the ground.
3. Clean basements and attics of rubbish.
4. Cut high weeds and grass.
5. Keep large rocks, etc., scattered so as to eliminate harborage.
6. Keep foods properly protected.
7. Feed chickens in a sanitary feeding trough.
8. Store food products in rat-proof containers.
9. If the infestation is beyond your control, call the Memphis and Shelby County Health Departments or a pest control firm.

Elsewhere in this issue, and recommended reading, is a reprint of an article by Miss Jane Stafford, Science Service Medical writer, which appeared in the Memphis Press-Scimitar, on January 12, 1943, entitled "Starve, Kill and Build Out Those Rats." Like Miss Grinnel, Miss Stafford gives the Industry the nod, points the need of public co-operation and ratproofing of garages, sheds, houses, etc.

Does the PCO fit into this picture? To ask the question is to frame the answer. To achieve his own maximum participation in such a program, the PCO must true up his approach to the problem with that of the Health Departments which quite correctly insist that rat control is not merely a matter of baiting, gassing and trapping, but must include ratproofing and clean-up of harborages and debris by the public.

In any well-planned over-all rat control program, coordinating factors to help activate community awareness of its obligation to ratproof and to maintain sanitary conditions include: utilization of Health Department inspectors of course, distribution of literature or a survey form of the type outlined by the NPCA. And, space and other circumstance permitting, a paragraph summarizing specific ways, advocated by the Health Department, in which the community may do its part, might well find its way into the regular advertising channels of the PCO. From the long range point of view, this would strike not only a responsive chord in many places but enhance the PCO's professional standing, to say nothing of its potential effect on the war effort.

The Army Wants Your Advice On Pest Control

YOU HAVE IDEAS. Every day and every hour you are thinking. Some of your ideas are day dreams you wouldn't mention to anyone. Some are ideas you plan to use yourself—after the war. Often you think seriously about how you can help win this war. Its possible that you may have an idea you honestly believe will help—if only you can get it to the right people. The right people want your idea and will get it if you will mail it to The Engineer school at Fort Belvoir, Virginia. A suggestion system is operated by authority of The Chief of Engineers to help all engineer troops get ideas delivered to the right people.

You are authorized to mail your ideas direct without going through any other military channels. Simply tell about your idea in a letter using the same plain language you would use in explaining to a friend. Include all the sketches you wish to send. Add your full name, rank, organization and military address so reports can be sent to you as to what happens to your idea. Civilians also are invited to send suggestions.

No useful idea is too small to report. This man's army needs new ideas. Yours may help.

Your suggestion will be acknowledged, studied by competent experts, approved and adopted, or not approved. Yes, some ideas are not approved, but your idea may be just the answer needed to solve some important problem —large or small.

Pyrethrum Conservation Imperative!

REPRINTED herewith from Service Letter 282, through courtesy of the NPCA, is a clear-cut analysis of the pyrethrum situation, insofar as it affects the PCO, with divers suggestions to implement ways in which such pyrethrum supplies, as may be made available, may be best employed to insure maximum coverage of minimum "must" requirements:

"Much has been hinted or said, perhaps more rightfully attributed to the well known 'rumor factory', that restrictive amendments are contemplated with regard to the Pyrethrum Allocation Order M-179 to the effect that the pest control industry was to be excluded from receiving any pyrethrum. At this writing there has not been completely formulated the phraseology of the restrictive amendments but there has been submitted to the War Production Board certain essential needs heretofore emphasized in Service Letter No. 280, which needs are recognized.

It is unnecessary to dwell upon the essential needs of our Armed Forces and certain Agricultural insect control. Both of these fields will without question NOT RECEIVE all that they desire. The Pest Control Operator likewise cannot hope to receive anything approximating his desires but it is recognized that in certain service work (application and dusting procedures) there must be used non-poisonous powder to meet situations where the hazards would be too great if poisonous substances were used.

Contemplation of the restrictive amendments to the Pyrethrum Allocation Order M-179 may or may not refer specifically to pest control operators or to a classification of specific uses, but assurances have been given that pest control operators will be given consideration for definite phases of service work on some equitable or proportionate plan which is undergoing careful study.

All of this is another way of saying that every firm must recognize the importance of conservation and **use Pyrethrum powder only in places where absolutely necessary**; avoid using it in any of your former mixtures where such powders were used generally. In placing your orders with your normal chemical or supply houses, be sure that your certification clause is concluded but be very specific to show that the **uses in service work** will be only for mandatory purposes which involve laws that require such use as well as the consideration you must give to hazardous factors where there are possibilities of direct contact between insecticide and food products, and hence to avoid illness and deaths Pyrethrum must be used instead of poisonous substances.

It would be well to include specific **uses** for which Pyrethrum is required when placing your orders, as for example:

(A)—Food dispensing establishments of every kind, such as restaurants, kitchens of publicly patronized structures, such as hotels, meeting halls, railroad dining cars, etc.
(B)—Institutions, such as Old Folks' Homes, Salvation Army Halls, Missions, Children's Homes, Universities and Colleges, Asylums, etc.
(C)—Hospitals.
(D)—Industrial Plants where there are various and sundry methods of food handling and eating, such as portable eating carts, etc.
(E)—Delicatessen and grocery stores.
(F)—Butcher Shops.
(G)—Public Markets.
(H)—Drug Stores and their soda luncheonette fountains.
(I) —Vessels—galleys, etc.
(J)—Stored food products of specific types

May we also add that the present situation with regard to many "certifications" not being issued for orders that you have been placing in the last two months is due entirely to the serious shortage. Prospects are not bright but be assured that every possible consideration is being given to our industry with particular reference to specific needs as indicated above."

Notice

We are glad to print personal items of interest. Send us interesting or newsy items about yourself or your family. This magazine is for the pest control industry, and news about YOU is interesting to the rest of us.

The First Canadian Pest Control Operators' Conference

University of Montreal, March 18, 19, 20, 1943.

INEXTRICABLY tied up with the striking growth of the individual PCO and the Industry as a collective entity, in the last decade, has been the series of nation-wide Conventions and Regional Conferences many of which the more progressive Canadian operators have attended. Without these opportunities for mutual co-operation and discussion, it is questionable, if not improbable, that the Industry would have achieved the public respect and entomological recognition that it has. But, as a famous Englishman has said in another direction, "this is not the beginning of the end but only the end of the beginning."

Now, at last, after much intelligent forethought and unremitting energy, the First Canadian Pest Control Operators' Conference is to be held at the University of Montreal, March 18, 19, 20, 1943, to which all Canadian and American PCOs are cordially invited. We should like to emphasize that neither membership, actual or contemplated, in any pest control group is a condition of admittance to the Conference, nor are there any ifs, ands, buts or other strings tied to this welcome; the only condition being that you are engaged in pest control work, practically or theoretically.

For those still on the fence with regard to the practical wisdom of Conference attendance, reprint from Service Letter No. 281, of actual findings by those who reacted similarly about Conferences in the U. S., is of analogous moment:

(a)—The customers and clients recognized the necessity of one attending educational, practical discussions and demonstrations, that meant better pest control services.

(b)—One idea or suggestion taken from the Conference offset not only expenses involved but actually made for savings in chemicals, labor, methods —hence more efficiency and money in one's pockets.

(c)—Business went on as usual and it went on better, especially as any employees left behind were more particular about work being done in order to give a good accounting of themselves when the "Boss" returned.

(d)—Information which cannot be obtained locally quite frequently was received during the discussions that took place during the Conference sessions.

(e)—The "treat" of rubbing elbows with the better firms throughout the industry and quite frequently discovering for the first time that a competitor about whom derogatory stories had been heard is not as bad a fellow as pictured. Indeed, the Conferences afforded a means of discussing with competitors alleged "stories" and unethical practices.

(f)—In these important all-out war effort days, one has the opportunity to gather first hand information with regard to critical chemicals and equipment shortages; how to meet problems with substitutes or other methods; to understand fully what Governmental Agencies expect and exact.

From experience, we have found that it is of immeasurable assistance to every Conference Committee to anticipate the number who will attend and above all have ready upon your arrival a bound copy of what is termed the "Conference Manual." These Conference Manuals have run as high as 200 pages but for the most part, there are approximately 75 to 100 pages of valuable information, which, at the same time, serves as background for the laboratory work, addresses, and other demonstrations that take place at the Conference. It is for that reason that we are urging that you fill out immediately the registration form made part of this mailing and thus assist Professor E. R. Bellemare and his committee to have everything in readiness for you. (If you have already sent in your form, it is not necessary to send in another.)

Program

First Canadian Pest Control Operators' Conference

March 18-19-20, 1943.

University of Montreal, Montreal, Que.

Thursday 9:00-9:30 A.M. — Registration, Faculty of Sciences Office, E'415.

Thursday 9:30 A.M. — Biology Classroom, D'615.
- Greetings and Introduction, Dr. Georges Prefontaine
- Address of Welcome, Mgr. Olivier Maurault, Rector
- "The Dominion Entomologist and the PCO," L. S. McLaine
- "Pest Control and Sanitation," A. Cousineau
- "Insect Structures," Gustave Chagnon
- "The Biology of Insects," Father O. Fournier.

Thursday 2:00 P.M.—Visiting Tour of the University Building. Leaving from the Cafeteria, with Father O. Fournier as Cicerone.

Thursday 3:00 P.M. — Biology Laboratory, B'604.
- Laboratory Clinic, Father O. Fournier-G. Chagnon
- (Study of Insect Structures, Dr. L. P. Dugal-Dr. G. Prevost
- Dissection of an Insect, Dr. Dansereau-Dr. G. Gardner
- Exhibition of Common Insect Pests, E. R. Bellemare.

Thursday 7:30 P.M.—Biology Classroom, D'615 F. E. Bohman, Chairman.
- "Origin and Properties of Chemicals used by PCO," L. Hynes
- "Theories of How Insecticides Kill," Dr. Alfred Weed
- Movies
- Questions and Answers—"Rats and Mice," F. E. Bohman, Chairman; W. O. Buettner, A. Friedman, E. R. Bellemare.

Friday 9:30 A.M.—Biology Classroom, D'615 W. O. Buettner, Chairman.
- "Dog Ticks," Charles E. Pomerantz
- "Insects and Man," C. R. Twinn
- "Insects and Food Products," A Member of the Division of Plant Protection—Canadian Department of Agriculture.

Friday 2:30 P.M.—Gov't Fumigation Station, 785 Mill Street. H. A. U. Monro, in charge.
- Visit of Station—Vacuum and Atmospheric Chambers
- Demonstration—Action of Hydrocyanic Acid gas on various species of Insect Pests.
- "Fumigation Safety Measures," Bartlett W. Eldredge
- Questions and Answers—"Fumigation," H. A. U. Monro, Chairman; Bartlett W. Eldredge, Dr. D. K. Lee, L. Hynes, Dr. George H. Chapman.

Friday 7:00 P.M.—Cercle Universitaire, 515 E. Sherbrooke Street.
- Banquet
- Toastmaster, W. S. Bomby
- Guest Speaker, W. O. Buettner

Saturday 9:30 A.M.—Biology Classroom, D'615 R. W. Menzie, Chairman.
- Election of Officers and Directors for 1943-1944
- "The Pesticides Administrator and the PCO," A. M. W. Carter
- Report by Constitution and By-Laws Committee
- Report by Resolution Committee
- Open Discussion.

Saturday 1:00 P.M.—Meeting of the Board of Directors.

The program will be substantially as submitted but there may be a few additions or slight changes in presentation of the program sessions. The following list of participants, also subject to additions, will at least acquaint you with the personnel of the faculty or leaders of the discussions:

Dr. Georges Prefontaine, M.D., L.Sc., Chief, Institute of Biology, University of Montreal.
Mgr. Olivier Maurault, Rector, University of Montreal.

L. S. McLaine, Dominion Entomologist, Ottawa, Ont.
Gustave Chagnon, Professor in Entomology, University of Montreal.
Father O. Fournier, Chief in Entomology, University of Montreal.
L. Hynes, Organic Chemicals Division, C.I.L.
Dr. Alfred Weed, Ph.D., John Powell & Co. Inc., New York, N. Y.
F. E. Bohman, President, The National Pest Control Association, Hartford, Conn.
Wm. O. Buettner, Secretary, The National Pest Control Association, Brooklyn, N. Y.
Charles E. Pomerantz, Bell Extermination Co. Inc., New York, N. Y.
Dr. C. R. Twinn, Ph.D., Associate Dominion Entomologist, Ottawa, Ont.
H. A. U. Monro, In charge, Govt. Fumigation Station, Montreal, Que.
A. M. W. Carter, Director of Pesticides, W.P.T.B., Ottawa, Ont.
Dr. George H. Chapman, American Cyanamid & Chemical Corp., New York, N. Y.
Dr. L. P. Dugal, Ph.D., Assistant Chief, Institute of Biology, University of Montreal.
Dr. P. Dansereau, Ph.D., Institute of Biology University of Montreal.
G. Prevost, Institute of Biology, University of Montreal.
Dr. G. Gardner, Ph.D., Institute of Biology University of Montreal.

Other guests from the United States, from Ottawa and from Toronto are also expected to attend the Conference but are holding announcement of their name until we have a definite answer from them.

Be sure to send in your "Informational Registration" form and thus assist the Committee on Arrangements.

Informational Registration

First Canadian Pest Control Operators' Conference
University of Montreal, Montreal, Que.
March 18-19-20, 1943.

Name:.....
Address:.....
Firm Name: Your Connection:.....
Years in Business:.....
Especially interested in ants, cockroaches, bedbugs, silverfish, booklice, rats and ? (Write in order of importance to you).....

What do you expect to get out of this Conference?.....
What problems would you prefer to have discussed?.....

(If there is not sufficient room to mention the problems you have in mind, use the reverse side)
Please indicate on reverse side any specific questions you desire answered.

Registration fee $8.00 Check enclosed ( ) Will pay on arrival ( ).
Note: If you want reserved a copy of the Outline, etc., whether or not you attend, $3.00 must be sent now.
Please enclose an additional $1.65 if you are to be with your wife or girl friend at the banquet.

Please send this questionnaire to Professor E. R. Bellemare, University of Montreal, 2900 Mount Royal Boulevard, Montreal, Quebec, Canada. If $3.00 is attached, there will be reserved for you a copy of the Outlines, etc., whether or not you attend.
(Be sure to fill in additional information on reverse side)

HOTEL RESERVATION

The situation in Montreal with regard to Hotel accommodations is no worse nor any better than prevail at other large cities in these days. If anything, Montreal is hard hit. Some hotels will guarantee some five or six rooms; others none at all. To facilitate matters one of the Organizing Committee members, Mr. A. Friedman, will take care of your reservation providing he knows of your requirements as soon as possible, preferably before March 8th, 1943.

Fill in the information below and we will do everything possible to accommodate you. State your preference as to hotel in the brac. ets provided by indicating 1st, 2nd, 3rd choice. The situation with regard to hotels at this writing is:

Hotel Windsor (chances scant).....( )
Queen's Hotel.....( )
Mt. Royal .....( )
(Ford (lower rates but crowded).....( )
Any other preference .....( )
Please reserve: One room for one.....( )
One room for two.....( )

I (we) will arrive on March....., at about..... A.M. P.M.
Rates: These will be from $3.50 to $5.00, room for one person.
$5.00 to $8.00, room for two persons.
All rooms with bath.

Moths Conquer Japanese Flag

For persons who believe in symbolic predictions of the future, there is comfort in a little incident which recently occurred in Framingham, and bodes no good for the Sons of Heaven.

Mrs. Arnold B. Toland, of 35 Burdett avenue, made a set of flags of various nations, two few years ago, out of woolen bunting material and, after their initial use, they were stored away at her home.

Recently Mrs. Toland had occasion to take the flags out to display at club and Red Cross gatherings, and one of the flags—that of Japan—had been so badly damaged by moths that it is no longer useful. None of the other flags was touched.

Either American moths have developed an unusual strain of patriotism, or they are instruments of fate. At any rate she is sure the incident augurs that American armed forces will wreak similar destruction on the Land of the Rising Sun.

Note of Caution

From now on no one is authorized to accept new OR renewal subscriptions to "Pests." Play safe; send all subscriptions, new OR renewal, direct to Pests, 512 East 14th Street, Kansas City, Mo. Your cooperation will be appreciated—it will also save misunderstanding all around.

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151 WEST 19th STREET, NEW YORK, N. Y.

We much regret to report the continued shortage of Pyrethrum Powder and Concentrated Pyrethrum Extracts. Allocations from the W. P. B. are few and far between. As fast as we get a delivery we ration it out to our customers.

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CARBOLIC ACID, Crystals and Liquified
***CRESYLIC ACID, 1 and 5 gallon tins**
***SODIUM FLUORIDE, bbls. and kegs** — **FLUOREX V** — **PHOSPHORUS PASTE**
POISON SEED for Mice and Rats
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***Prices reduced.**

Sixth Annual Pacific Coast Pest Control Operators' Conference

University of California, Berkley, Calif., February 3, 4, 5, 1943

THE 104 PCOs who registered for the 3-day semester at the Sixth Annual Pacific Coast Pest Control Operators' Conference were amply rewarded with a well-balanced well-planned program, designed to facilitate solution to specific problems inherent in furthering the war effort. Instrumental in making the Conference program possible and responsible for its success were: Director, Dr. G. E. MacLeod, Professor of Entomology, University of Calif.; Arrangements, Dr. E. G. Linsley, Dr. A. E. Michelbacher; the Conference Faculty; Conference Laboratory Assistants; Conference Committee for the Industry; and the Program Committee.

Gracious and grateful acknowledgment of this fact was made in a statement, prepared by the two members of the Program Committee, E. O. Corson and V. H. Montgomery (who modestly omit all reference to their own indispensable activities), now a permanent part of the "Conference Reference Manual." It follows: "The year 1943 represents a milestone for the Pacific Coast Pest Control Industry since it marks the completion of five years of annual conferences. It also marks the second year of the participation of the United States in the war. This last fact makes the possibility of continued publication of conference proceedings uncertain during the immediate days which lie ahead. In view of these circumstances it has seemed desirable to make a special effort to provide the conference this year with as full and well-rounded a reference manual as it was possible to prepare in the short time available. This has been accomplished by utilizing the most important material available from our previous proceedings and adding to it new information which has not been previously covered. The fulfillment of this plan in a short period of time has required a real effort on behalf of the conference faculty. We, therefore, in behalf of the Pacific Coast Pest Control Industry, wish to express our grateful appreciation to the faculty which has made this and our previous conferences possible."

PROGRAM OUTLINE

WEDNESDAY

9:30 A.M.—Address of Welcome—Dean C. B. Hutchinson.

9:45 A.M.—Organization and Plan of Conference—Prof. G. F. MacLeod.

10:00 A.M.-12:00 Noon — Laboratory Sessions.

12:15 P.M.-1:30 P.M.—Luncheon, Hotel Durant. "Wartime Personnel Problems"—Mr. B. T. Kaiser.

2:00 P.M.-4:00 P.M.— Laboratory Sessions.

4:10 P.M.—General Assembly. "Wartime Problems of Packaged Foods" —Prof. E. O. Essig.

7:30 P.M.—Agriculture Hall, Room 113. "Rodents and Disease"—Dr. K. F. Meyer.

THURSDAY

9:30 A.M.—Faculty Conference Period.

10:00-12:00 Noon—Laboratory Sessions.

12:15-1:30 P.M.—Luncheon, Hotel Durant. "Pending Legislation Affecting Pest Control Operators" —Dr. E R. de Ong.

2:00-4:00 P.M.—Laboratory Sessions.

4:10 P.M.—General Assembly, Room 113. "Economic Poison Supply Under War Conditions" — Prof. G. F. MacLeod.

7:30 P.M.—Public Address, Agriculture Hall, Room 113. "Potential Changes in Everyday Living As a Result of the Impact of War on Chemical Science" —Prof. Marle Randall.

FRIDAY

Agriculture Hall, Room 113.

9:30 A.M.—Accident Prevention and First Aid—G. A. Rader.

10:00-12:00 Noon—Laboratory Sessions.

12:15-1:30 P.M.—Luncheon, Hotel Durant. The Industry Speaks.

2:00-4:00 P.M.—Laboratory Sessions.

4:10 P.M.—"Western Lumber, Its Grading, Preparation, Use and Availability in Wartime"—Prof. E. Fritz.

6:30 P.M.—Banquet, Claremont Hotel. Chairman, Jess Miller. Master of Ceremonies, Prof. G. F. MacLeod.

LABORATORY SECTIONS

1. Wood Destroying Organisms (E. G. Linsley).
2. Control Methods and Materials (W. M. Hoskins).
3. Rats and Other Household Rodents (W. S. Mangold and W. W. Sampson).
4. Insects and Public Health (M. A. Stewart).
5. Household and Dooryard Pests (A. E. Michelbacher).
6. Stored Products Insects (E. O. Essig).

Starve, Kill and Build Out Those Rats

By JANE STAFFORD,
Science Service Medical Writer

You have resolved for 1943, among other things, to fight rats because these animals spread five different diseases and besides are a costly nuisance, destroying valuable property and eating food that cannot be spared during war time. Carry on your war on rats along the following three lines.

1. Starve them out. Do this by storing garbage in covered containers, metal if at all possible to get. This is especially important in communities where labor shortage is causing delayed or curtailed garbage collection service. Store food in covered containers of glass or wood. Keep floors, stairways, alleys, streets and backyards free from bits of food and garbage.

2. Kill them. Try to find the holes the rats used to enter the house and set traps there and other places where rats usually pass. Set several traps at a time, using different kinds of bait, such as meat, fish, vegetable, cereal or chocolate. Tie the bait securely on the trigger and don't let it become spoiled or rancid. Don't use rat poisons, since these can kill people, too, if mixed with food by mistake. **Leave the use of poison gas to a professional exterminator who can handle it safely.**

3. Build them out. Keep the entire house free from rubbish, such as paper, sawdust, excelsior or old mats that rats could use for nests. Stack wood, paper or boxes neatly on platforms raised at least 18 inches off the ground. Fill in all holes around wires or pipes with a mixture of plaster or concrete mixed with broken glass. Cover all holes with a piece of metal sheeting or a tin can beaten flat. Check all doors and windows to be sure they fit tightly. Replace or board over broken doors or windows. Clean drains of accumulated material. Fill or block up all dead spaces in floors and walls whenever possible. Use cement, concrete, metal or brick instead of wood which rats can gnaw through. Remember to ratproof garages, sheds and the like as well as the house.

—*Memphis Press-Scimitar.*

Pure Logic

Of what avail is earliness?
The greedy bird was early, yes;
Still earlier the wriggling worm.
Yet anybody will affirm
That if he'd been a bit belated
He'd not have been exterminated.

LOUISE SHAW.
—*N. Y. Herald-Tribune.*

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B. 31
c/o PESTS

Unification Of West Coast Operators Finds Expression Through Medium Of First Annual Convention

Pest Control Operators of California, Inc., February 1 and 2, 1943

Hotel Durant, Berkeley, Calif. . . . Prominent Entomologists and State Officials Speak . . . Officers Elected.

LEITMOTIF of the First Annual Convention of the Pest Control Operators of California, Inc., attended by a cross-section of PCOs from the State, was the paramount need of a unified industry in California.

J. E. McNatt, of the Foss Construction Co., Pasadena, was elected president for ensuing term; Arthur E. Eddy, of the Green-Cross Co., vice-president; A. T. Parsons, of the Bay Pest Control Co., Burlingame, treasurer; Ray M. Dewey, Arwell Service, Los Angeles, secretary. Retiring officers were: Robert B. Loibl, president; William Hogan, 1st vice-president; D. G. Rennie, 2nd vice-president; and J. M. Miller, secretary-treasurer.

Though the Convention opened informally on Sunday, January 31st,

D. G. Rennie, Pres. Associated Pest Control Operators, Inc.; J. E. McNatt, Pres. Pest Control Operators of California, Inc. (California's New Association); William Hogan, Pres. California Pest Control Association, Inc.

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MEMBER NATIONAL PEST CONTROL ASSOCIATION

with registrations, a Directors Meeting and good fellowship the order of the day, the formal sessions, however, got under way on Monday, February

First Annual Convention, Pest Control Operators of California, Inc., February 12, 1943, Hotel Durant, Berkeley.

first, with the usual Invocation and Salute to Flag preliminaries, an Address of Welcome by Honorable Frank S. Gaines, Mayor of City of Berkeley and the Annual Message of the President. A talk by David Williams, Registrar, State Structural Pest Control Board, "Unity in the Pest Control Industry," and another by Dr. G. F. MacLeod, Department of Entomology, University of Calif., "Pest Control in War-Time" brought the morning's session to a terminus. At the group luncheon, Dr. A. J. Cox, Chief, Division of Chemistry, State Department of Agriculture, was the speaker.

The afternoon's program started with a discussion of "Termites, Wood-Boring Insects and Other Wood-Destroying Agencies," with D. G. Rennie, presiding, and an open forum on: Inspections and reports, estimates and specifications, F.H.A. Commitments and affidavits, and ethics in competitive bidding. Wind-up for the day was a discussion of a pest control business, "Is Your Business a 'Going Business' or Is It 'Going Under'," with L. W. Christensen, presiding, in which, securing business, building a clientele, costkeeping and inventories, and relationship with war manpower, were the chief highlights.

During the evening a Termite Film and a General Pest Film were shown by H. J. Davies and William Hogan.

Prof. E. O. Essig, Department of Entomology, University of California, started the Tuesday A.M. ball rolling with a talk, "General Household Pests," followed by an open forum discussion. "Importance of Rat Control in War-Time," a talk by Walter S. Mangold, Director of National Health Sanitation, Berkeley, was next in order. Subsequent to this, R. R. Beck, of the American Cyanamid and Chemical Co., San Francisco, spoke on "Household and Warehouse Fumigation." An open forum ensued. Speaker at the luncheon following, was Director Percy C. Heckendorf, State Department—Professional & Vocational Standards.

An afternoon business meeting wrote finis to the uniformly helpful program of business and technical talks which were so important a part of the First Annual Convention of the Pest Control Operators of California. The Convention, in its own way, undoubtedly contributed materially towards the goal of a more unified State industry. And appropriately enough, if not symbolical of the very-much-to-be-desired unity, was the Convention Dinner, Tuesday evening, at the "Durant," at which A. A. Beliveau of Alhambra toastmastered so genially, and where all foregathered to "break bread" and to while away the hours pleasantly in the companionship of family and friends of the Industry.

How to Get Rid of African Cooties

Lt. O. V. August, 27, naval flier from Whittier, Cal., who participated in the North African landing operations, took a champagne bath in Casablanca.

He related today that after his plane was downed he was taken prisoner and lodged for one night in an old stable where he "caught a beautiful case of cooties."

Upon his release he went to a Casablanca hotel where he said he "couldn't get any sleep because these cooties kept biting."

Figuring alcohol would be a good disinfectant, he said, he bought several bottles of champagne at 17 cents a quart.

"I stood in the bathtub," he said. "With one hand I poured it over me and with the other, into me."

—*N. Y. Herald-Tribune.*

Sixth Annual Pacific Coast Pest Control Operators Conference Banquet, Hotel Claremont, Oakland.

The Recognition and Control of Deathwatch, Powderpost and False Powderpost Beetles

By E. GORTON LINSLEY, *University of California, Berkeley*

THE DEATHWATCH, powderpost and false powderpost beetles represent three distinct but related groups of insects. They have the common habit of attacking cured wood and several species are very injurious to structural materials. Because of their ability to breed for long periods of time in the same wood, products, once attacked may be completely reduced to pulp if the infestation is left unchecked. Damage caused by these beetles is often confused by the untrained person with that caused by termites, but it may be distinguished by the fact that it is usually found in dry, sound wood in locations which are often inaccessible to termites, that the surface usually exhibits perfectly round emergence holes through which the beetles have escaped, and that the burrows are filled either with a loose powder (powderpost beetles), tightly packed boring dust (false powderpost beetles), or minute pellets (deathwatch and furniture beetles). The drywood termites **(Kalotermes)** sometimes breed in dry, sound, relatively inaccessible wood, but the pellets which fill their tunnels are larger, with squarish ends, and the insects are ant-like rather than grub-like. The tunnels of the subterranean termites **(Reticulitermes)** are more or less irregular and are not filled with boring dust or wood pellets. They are most frequently found in wood which is in contact with or close to the ground.

IDENTIFICATION

Key to Adult Beetles

1. Tibiae with distinct spurs at tip—2.

Tibiae with obsolete spurs at tip; body nearly cylindrical; antennae with last three segments enlarged (fig. 1A), rarely saw-like (fig 1B) or comb-like — (Anobiidae) deathwatch and furniture beetles.

2. Body nearly cylindrical; antennae with last three segments enlarged (figs. 1C, 1D); first abdominal segment but little longer than second segment—(Bostrichidae) false powderdust beetles.

Body somewhat flattened; antennae with last two segments enlarged, forming a rounded club (fig. 1E); first abdominal segment much longer than any of the following segments—(Lyctidae) true powderpost beetles.

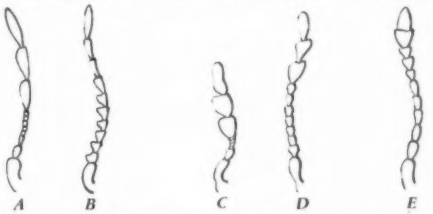

Fig. 1. Antennae of adult beetles. A and B, deathwatch beetles, C and D, false powderpost beetles, E, powderpost beetles.

Key to Larval Beetles

1. Legs with three segments (fig. 2C); upper surface of body without

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rows or patches of small, dark, polished, dot-like tubercles; head oblong or squarish, withdrawn into prothorax; mandibles with a tooth on the inside margin—2.

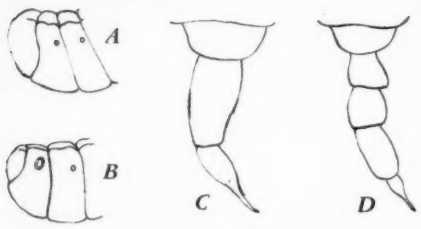

Fig. 2. Structures of larvae. A, tip of abdomen of deathwatch and false powderpost beetles showing small spiracles, B, tip of abdomen of powderpost beetle showing large spiracle, C, leg of powderpost and false powderpost beetles, D, leg of deathwatch beetles.

Legs with five segments (fig. 2D); upper surface of body with rows or patches of small, polished dot-like tubercles; head more or less rounded, exposed; mandibles without a tooth on inside margin—(Anobiidae) deathwatch and furniture beetles.

2. Abdomen with all spiracles about the same size, the last (eighth) pair not larger than the others (fig. 2A). —(Bostrichidae) false powderpost beetles.

Abdomen with last (eighth) pair of spiracles much larger than the others (fig. 2B)—(Lyctidae) true powderpost beetles.

Key to Damage

1. Emergence holes 1/8 inch or more in diameter; burrows tightly packed with boring dust or filled with small, loose, granular pellets—2.

Emergence holes about 1/16 inch in diameter, burrows paralleling the grain, confined to sapwood areas, filled with fine, loose, flour-like boring dust (fig. 3B); in seasoned hardwoods.—(Lyctidae) true powderpost beetles.

tightly packed, somewhat adhesive boring dust (fig. 3C).—(Bostrichidae) false powderpost beetles.

Burrows running with and at right angles to the grain, filled with loose, granular pellets (fig. 3A).—(Anobiidae) deathwatch and furniture beetles.

APPEARANCE AND HABITS

Like other beetles, these insects pass through three distinct stages after leaving the egg. These are the larva (grub), pupa (transformation stage) and adult. The adults are mostly small, elongate, robust or cylindrical beetles. The larvae are whitish grubs with a somewhat darker head, partly coiled body, enlarged thorax (area behind head bearing the three pairs of short legs) and a tapering abdomen which is sometimes slightly swollen at the tip (fig. 4, left). The pupae are also pale at first, and resemble the adult in general form but have the legs and antennae held in close against the body.

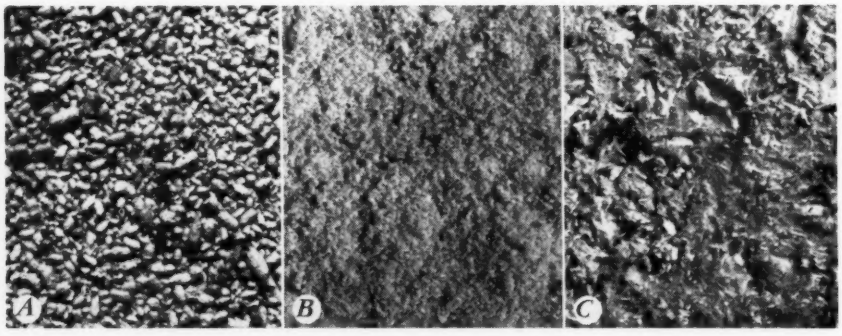

Fig. 3. Larval frass and excrement (X 10). A, deathwatch beetles, B, powderpost beetles, and C, false powderpost beetles.

2. Burrows winding or running largely with the grain, filled with

The deathwatch and furniture beetle belong to a group known as the Anobiidae. They are compact beetles with a hood-like prothorax which more or less hides the head from above. The name "deathwatch" beetle results from superstition associated with a ticking noise produced by the beetles during the mating season. This sound produced by rapidly striking the lower part of the head against the surface of the burrows, is repeated at intervals and responded to by other beetles. Because it is apt to be most conspicuous in the quiet hours of the night, perhaps while one is "sitting up" with a sick person, it came to be known as the "death watch" beetle. Not all of the species are known to make this ticking sound. It has not been witnessed in any of the native American species of anobiids, although the writer has heard a similar sound produced on several occasions by one of the false powderpost beetles **(Polycaon stoutii)**. Prior to 1913, the deathwatch beetles were largely viewed with curiosity, regarded as minor pests. However, in that year extensive damage was uncovered in Westminster Hall in London, and subsequent surveys revealed serious injury to several cathedrals and other historical buildings. In the United States similar injury has also been discovered. Recent surveys have shown that damage by these beetles is widespread and serious. In nature they perform a useful purpose by hastening the destruction of dead and decomposing trees. When they attack structural and other wood products they breed in them for generation after generation until the wood has been completely honeycombed, leav-

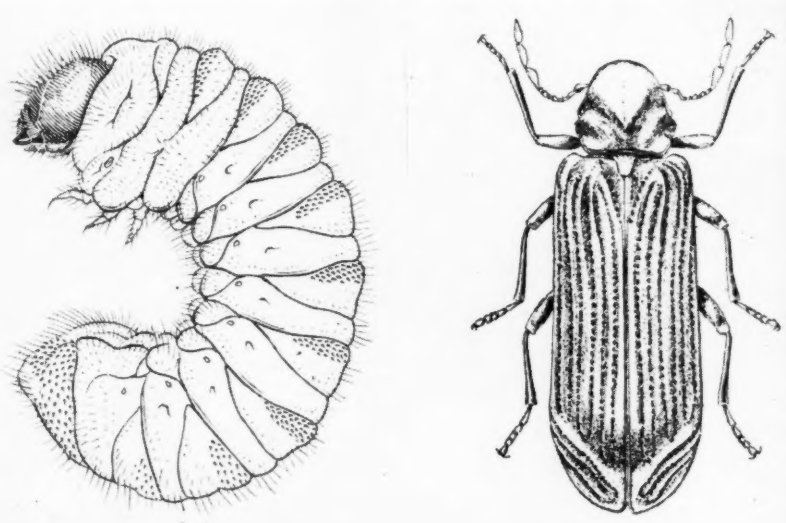

Fig. 4. The California deathwatch beetle, larva and adult.

ing only a thin surface layer intact. Most of the species prefer wood which is old, especially that which is moist or fungus-infested. Unfinished wood is most susceptible to attack. The eggs are deposited in cracks or crevices in the wood or in old emergence burrows. The larvae hatch a few weeks later and tunnel into the wood. At first they usually burrow with the grain but later they cut across the grain producing a honeycombing effect. The length of the larval period may last from one to ten or more years, depending upon the moisture and fungus content of the wood. Normally they confine their attacks to sapwood area but in old, fungus infested wood will occasionally work into the heartwood. As they bore through the wood, the larvae excrete small pellets of partly digested wood. These pellets (fig. 3A) resemble those of drywood termites but are much smaller and taper at each end. When the larvae are full grown, they tunnel toward the surface and construct an oval cell in which to transform. The transformation (pupal) period usually lasts two or three weeks, after which the beetles bore their way to the surface and escape. The emergence holes which they leave behind are usually oval, 1/16 to 1/8 inch in diameter, and if a blow is struck on the surface small wood pellets will usually drop out. These emergence holes are normally the first evidence of the presence of beetles in the wood. The more important species are as follows:

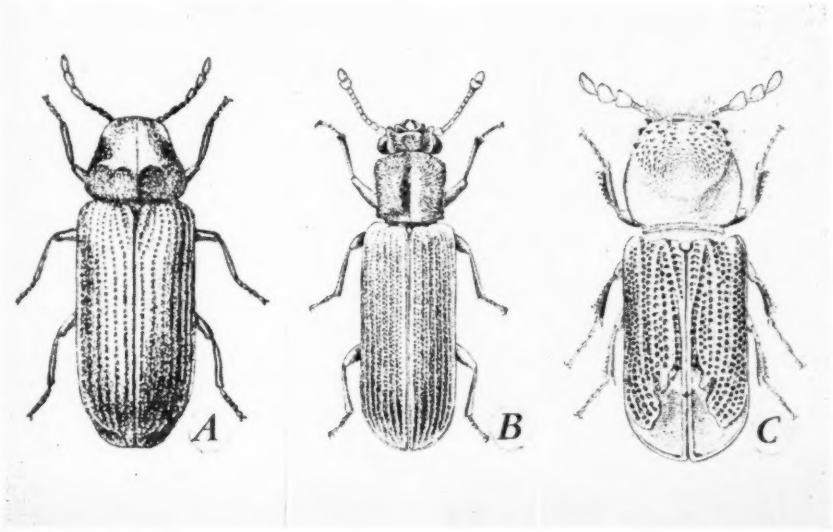

Fig. 5. A, the furniture beetle (after Gahan), B, the western powderpost beetle (after Van Dyke), and C, the lead-cable borer (after Van Dyke).

The furniture beetle [**Anobium punctatum** DeGeer] (fig. 5A) is a cylindrical, dark brown beetle 3-4.5 mm. long. The antennae have the last 3 segments distinctly longer than preceding and the prothorax is convex above and excavated beneath for reception of head in repose. The wing covers have linear rows of punctures and the metasternum is abruptly excavated in front. The larvae may be recognized by the presence of spinules on the first eight abdominal segments but none on the ninth segment. Both well seasoned coniferous and non-

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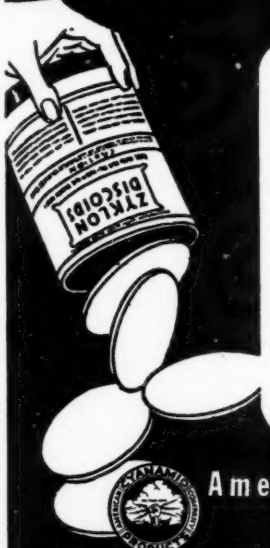

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coniferous hard and soft woods are infested. Normally the eggs are laid in slits, cracks or old emergence holes. The larvae burrow in wood for one or more years, tunnelling up near the surface to pupate. Later the adults emerge through holes 1/10-⅛ inch in diameter. Furniture is more commonly attacked than structural timbers but the latter are by no means free from injury. Furniture beetle is fairly common in certain parts of eastern North America but is apparently not on the Pacific Coast. Infestations in this last area which have come to our attention are rare and isolated. Most of these have been in imported furniture.

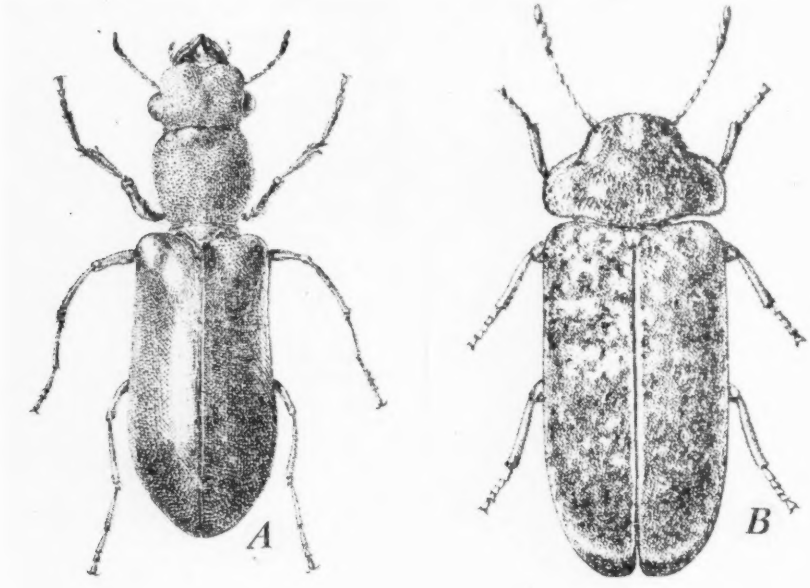

Fig. 6. A, the black polycaon (after Van Dyke), B, the deathwatch beetle (after Gahan).

The deathwatch beetle [**Xestobium rufovillosum** (DeGeer)] (fig. 6B) is a rather stout, parallel-sided, dark brown mottled beetle with patches of silky yellowish pubescence. It is 6-7.5 mm. long. As in the preceding species, the antennae have the last 3 segments distinctly longer than preceding, but the prothorax is only feebly convex above, not excavated beneath for reception of head in repose. The wing covers are without rows of linear punctures. The larvae have spinules on the sides of first six (rather than eight) abdominal segments as well as on the sides of the ninth segment. Its habits are generally similar to those of the furniture beetle but it usually infests structural timbers, more rarely furniture and books. The life cycle varies from one to many years depending on environmental conditions. The emergence holes of the adult average more than ⅛ inch in diameter. Old buildings are most subject to attack and large, poorly ventilated timbers, especially when moist or fungus infested, are preferred. The

(Continued on Page 23)

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Toxicity of Acrylonitrile, Chloroacetonitrile, Ethylene Dichloride and Other Fumigants to the Confused Flour Beetle

By HENRY H. RICHARDSON *and* A. H. CASANGES, *U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine*

TOXICITY tests of a number of chemicals, including acrylonitrile (Richardson & Casanges 1942), chloroacetonitrile, and ethylene dichloride, as fumigants were made in the laboratory against the confused flour beetle, **Tribolium confusum** Duv.

Materials and Methods.—The insects were reared on finely ground whole-wheat flour to which was added yeast and milk powder (8:1:1 by weight). Beetles 30 to 60 days old usually were used. The chemicals tested are listed in table 1. They were of C. P. quality except as noted.

All chemicals except methyl bromide were tested in a 5- or 6-liter glass flask (Fig. 1). The flask was first swept out with air at 50 per cent relative humidity and near 25° C. The pressure in the flask was lowered by suction to approximately 650 to 600 mm. of mercury, absolute pressure. Ethylene oxide was measured into the flask by a gas burette. The other chemicals were measured by means of a pipette graduated to 0.001 ml. Quantities as low as 0.01 ml. or less of liquids with a vapor pressure as high as that of carbon disulfide were accurately and conveniently measured by use of a 0.5-ml. hypodermic syringe lubricated with stopcock grease and attached to the pipette by a short piece of heavy walled rubber tubing (Fig. 1, C).[1] This apparatus could be easily moved about under the laboratory hood without loss of liquid. Immediately after the chemical was measured into the funnel (Fig. 1, B), the stopcock was turned and the chemical was drawn into the flask, where it evaporated at the lower pressure. When very small quantities of the more volatile chemicals were used, the stopcock was turned on slightly during measurement so that the chemical was drawn into the flask with a current of air as soon as it left the pipette. When evaporation was complete, air was drawn in to normal atmospheric pressure. The celluloid-covered rubber stopper with glass stopcock was then removed and quickly replaced by a ground-glass stopper from which a copper screen cage containing 50 to 75 insects was suspended (Fig. 1, right). Undoubtedly there was a small loss of gas-air mixture, but tests with ethylene dichloride indicated that mortality was just as high by this method as by the technique used by Strand (1930) and Shepard **et al.** (1937). This procedure (1) eliminated any possibility of droplets of

[1] This method has been used recently by the senior writer for the measurement of other insecticidal liquids and found very convenient.

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the chemicals, particularly those of lower vapor pressure, making direct contact with the insects before complete evaporation and (2) exposed the insects to the full concentration of the insecticide at the beginning of fumigation and kept them at normal atmospheric pressure at all times. The number of stopcocks and other glassware needed for introduction of the chemical was reduced to a minimum, since one set was sufficient for all tests. The results were practically the same whether a celluloid-covered rubber stopper or a ground-glass stopper was used on the flask. The type of stopper may be of importance, however when low concentrations of some chemicals are used. Good gas distribution was obtained simply from the air currents that swept in when the flask was brought back to normal atmospheric pressure, as indicated by the mortality of insects placed in the upper and lower portions of the flask.

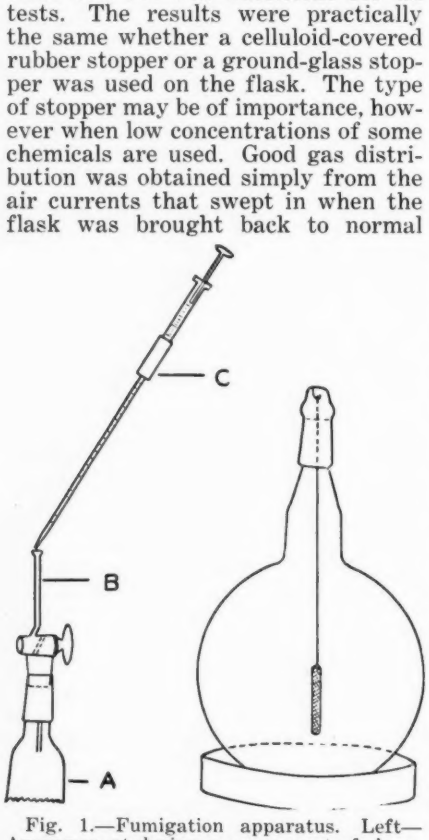

Fig. 1.—Fumigation apparatus. Left—Arrangement during measurement of chemicals into flask. A. Top of flask; B. Stopcock with attached funnel; C. Micropipette with syringe. Right—Arrangement during fumigation.

The insects were exposed to the fumigant for 5 hours at 25 + or — 0.5° C. Usually 6 to 8 tests, using various concentrations, were made of most chemicals. Fifty to 75 insects were used in each test. After fumigation the beetles were placed with a small quantity of flour in open vials[2] ¾ inch by 2 inches and held at 25° C. and approximately 60 to 70 per cent relative humidity. Examinations were made at 4, 10, 20, and in some tests 40 days after fumigation.

Methyl bromide was tested in a 7.7-cubic foot steel cylinder at 2½ hour exposures.

Post-Fumigation Effects.—Mortality counts were made over a period of 20 days or more after fumigation to determine the most suitable time to make final observations on efficiency. Some of the results are shown in figure 2.

With most of the chemicals there was little change in mortality over the period. The effect of ethylene dichloride was exceptional in that mortality gradually increased. Shepard & Buzicky (1939) found that ethylene dichloride produced a delayed mortality over the first 10 days after fumigation, but the present study shows that this effect continued beyond 10 days, 40 to 60 per cent of the beetles sometimes being killed between the tenth and twentieth days. There were only slight increases in mortality between the twentieth and fortieth days. The mixture of ethylene dichloride with carbon tetrachloride (Cotton & Roark 1927) was found to have a similar latent effect. Carbon tetrachloride alone appeared to have no latent effect in a preliminary test at the concentration used in the mixture.

Comparative Toxicity of the Fumigants.—Mortality data taken 20 to 21 days after fumigation were plotted on logarithmic probability paper, and toxicity curves were fitted carefully by hand. The approximate concentrations by weight to kill 50 and 95 per cent of the insects are given in table 1. Chemicals tested in 1939 and in 1941 gave similar results for the 2 years.

The most toxic chemicals were chloroacetonitrile and acrylonitrile. Chloroacetonitrile appeared slightly more toxic, but it had the disadvantage of being less volatile. Both chemicals gave toxicity values almost as high as those reported for hydrocyanic acid by Shepard **et al.** 1937. They had a slightly delayed killing action. For example, the insects appeared either normal or only slightly affected at the end of a 5-hour exposure to a killing dosage (3 mg. per liter), but all were dead 6 hours later. On the other hand, hydrocyanic acid has no latent effect on beetles that show life at the end of fumigation (Shepard & Buzicky 1939). Acrylonitrile and chloroacetonitrile had no pronounced delayed killing action after the fourth day, such as shown by ethylene dichloride (Fig. 2). Acrylonitrile (propenenitrile) is a colorless liquid with a boiling point of 78 to 79° C., near that of ethylene dichloride, and is used in the synthesis of artificial rubber. Both nitriles appear worth further investigation as fumigants (Peters 1940). More recent studies by the senior writer have shown both chemicals to be very toxic to the bedbug, **Cimex lectularius** L. Dudley & Neal (1942) have recently reported that the toxic action of acrylonitrile to warm-blooded animals is probably due to the cleavage of the molecule producing hydrogen cyanide. Guinea pigs showed a marked resistance, but dogs were very susceptible.

Two chemicals closely related to chloropicrin namely, 1,1-dichloro-1-nitroethane (O'Kane & Smith 1941) and 1,1-dichloro-1-nitropropane, appeared to be next in toxicity. The lat-

Table 1.—Comparative toxicity of various chemicals to **Tribolium confusum** in 5-hour exposures at 25° C. Static fumigations. Mortality data taken 20 to 21 days after fumigation.

Chemical	Approximate Concentration to Give—[2] 50 Per Cent Mortality	95 Per Cent Mortality
	Mg. per Liter	Mg. per Liter
Chloroacetonitrile[1] (CH_2ClCN)	†2	†3
Acrylonitrile[1] (CH_2:$CHCN$)	‡2	†3
Methyl bromide[1] (CH_3Br)	8[3]	11[3]
1,1-Dichloro-1-nitropropane[1] ($CH_3CH_2CCl_2NO_2$)	8	11
1,1-Dichloro-1-nitroethane[1] ($CH_3CCl_2NO_2$)	9	12
Ethylene dichloride (CH_2ClCH_2Cl)	6	12
Ethylene dichloride-carbon tetrachloride mixture (3:1 by volume) (CH_2ClCH_2Cl with CCl_4)	9	14
Methylallyl chloride (3-chloro-2-methyl propene) (CH_2:$C(CH_3)CH_2Cl$)	12	19
Methyl allyl bromide (3-bromo-2-methyl propene) (CH_2:$C(CH_3)CH_2Br$)	14	....
Ethylene oxide ($(CH_2)_2O$)	†20	†25
Carbon disulfide (CS_2)	56	100
Ethyl bromide (CH_3CH_2Br)	‡150	†200

[1] Technical products obtained commercially.
[2] † less than, ‡ greater than.
[3] Estimated from 2½-hour exposure.

[2] Open vials were used because studies have indicated that toxic concentrations of gases are likely to be formed when this beetle is kept for short periods in small, tight containers. When 70 to 75 beetles were held in a 125-ml. flask with a ground glass stopper, for 5 hours at 25° C. without the addition of air or fumigant, considerable mortality took place. When cork stoppers are used in place of ground-glass stoppers, there was little or no mortality. When an airflow of 6 liters per hour was maintained through the flask, or when 70 to 75 insects were kept in a 5-6-liter flask, no mortality occurred. It is not certain whether these effects are due to gas given off by the beetle (Roth et al. 1941), to the mixture with carbon dioxide, or to other factors.

ter seemed slightly more toxic, but it had the disadvantage of being less volatile. Methyl bromide, as tested in the steel cylinder, appeared to have about the same toxicity as these chemicals. The approximate concentrations to produce 50 and 95 per cent mortality in 2½-hour exposures were 16 and 22 mg. per liter, respectively. Assuming that gas concentration and exposure time were inversely proportional, as indicated by the work of Hamilton (1941), the respective concentrations for a 5-hour exposure would be about 8 and 11 mg. per liter. Methyl allyl chloride (Briejer 1938, 1939; Peters 1939) and methyl allyl bromide were less toxic than the chemicals previously mentioned. These closely related chemicals appeared to differ little in toxicity, but the mortality data for the latter were less consistent.[3] Ethylene oxide was close to these insecticides in the toxicity scale. Carbon disulfide was much less toxic than the other chemicals, followed by ethyl bromide. The toxicity values for the last two chemicals were fairly similar to those reported by Niefert **et al.** (1925).

Because of its great latent effect, ethylene dichloride had a toxicity value near those of methyl bromide and 1,1-dichloro-1-nitroethane. If it has such a latent effect on other insects, this may help to explain its wide use and apparently good efficiency in practical fumigation. The addition of carbon tetrachloride to ethylene dichloride (1:3 by volume or 2:3 by weight) to produce a noninflammable mixture seemed to increase the insecticidal action little, as judged by 20-day counts. (See also Shepard & Lindgren 1934.) In a series of five paired tests ethylene dichloride at concentrations of 7 to 13.9 mg. per liter produced an average mortality of 85.38 per cent (range 65.8 to 98.6 per cent), whereas the ethylene dichloride-carbon tetrachloride mixture at concentrations with the same weight of ethylene dichloride per liter produced an average mortality of 85.72 per cent (range 72.7 to 97.2 per cent). The average difference was 0.34 per cent, with a standard error of 2.05, indicating no significant difference.

The delayed killing action of ethylene dichloride brought up the question of whether the beetles laid viable eggs before they died. A preliminary test indicated that a few viable eggs might be laid when beetles are exposed to a concentration of 20 mg. per liter and that to prevent egg laying the concentration should be increased. Whether concentrations as great as 45 to 73 mg., as used by Strand (1930), Shepard **et al.** 1937, and Shepard & Buzicky 1939, are necessary is not known.

The high toxicity of some of these chemicals apparently was not due to the use of a weak stock of insects. Carbon disulfide, methyl bromide, and ethylene oxide gave results not far different from those reported by Shepard **et al.** (1937), who made mortality counts 40 to 48 hours after fumigation and counted moribund beetles as alive. In addition, the results with 1,1-dichloro-1-nitroethane indicated the insects to be of greater resistance than those used by O'Kane & Smith (1941).

Summary. — Laboratory tests on the toxicity of certain chemicals as fumigants were made against the confused flour beetle, **Tribolium confusum** Duv., in 5-hour exposures at 25° C. Small volumes of chemicals as volatile as carbon disulfide were

[3] Silverman & Abreu (1938) report methyl allyl chloride to be potentially dangerous to persons working with it in factories and laboratories, but this is true of most fumigants.

(Continued on Page 26)

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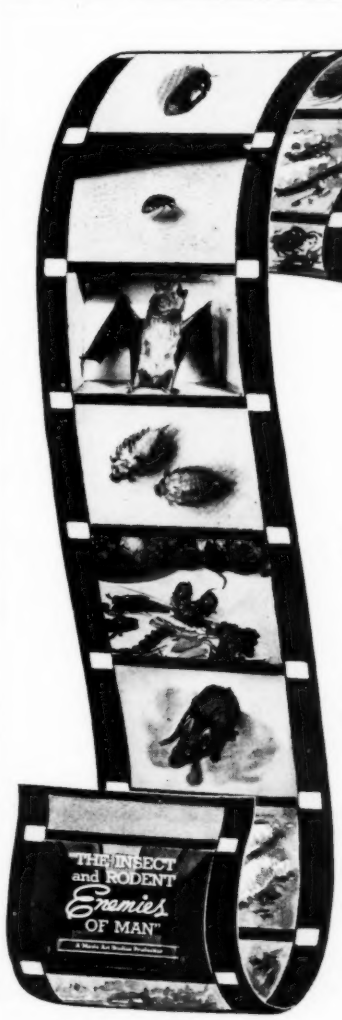

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Notice of Twenty-Second Annual Conference of the North Central States Entomologists

Lafayette, Indiana March 25-26, 1943

Program. Attached is the tentative program for the North Central States Entomologists' Conference, March 25-26.

The Central Plant Board will meet March 23 and 24

The Extension Entomologists meet March 24.

The Chinch Bug Conference will be held the evening of March 24.

All meetings will be held in the Purdue Memorial Union.

Program Procedure. As most persons receiving this notice are aware, the North Central States Conference is intended for the discussion of major problems of mutual interest. This year war problems will be stressed. In fact, the plans now call for three sessions where problems of general importance will be discussed,—leaving one-half day to discuss other problems, these to be divided into three separate sessions.

We have suggested leaders for each topic, and these leaders have been selected because of their known qualifications or because they have been suggested. As in the past, prepared papers to be read are not desired, but instead, except in the case of invited guests, especially from the personnel of the armed forces, the leader will briefly discuss his assigned topic, to be followed by discussion by all interested. **We urge everyone to study the program and be prepared, by advance consideration of the topics, to discuss them from each one's point of view.**

This year we have an opportunity to study and develop our many problems as never before, because in no small measure insects may play a major role in our war successes. Protection of crops and animals is to a major extent dependent upon insect control. Protection of processed food products against insect destruction is similarly a major problem. And above all, the protection of our armed forces and concentrated workers in defense plant areas against insects which are carriers of human diseases is a problem of greatest importance.

For the reasons here noted, we urge that everyone give careful thought to the problems listed and be prepared to offer "concentrated" reports and suggestions, to the end that we can cover as much ground as possible in the short time we convene.

Hotel Accommodations. Although army and navy personnel have priority on rooms in the Purdue Memorial Union, we have been assured that in all probability quite a few rooms will be available. We urge making early reservations, whether at the Union or at a local hotel.

Purdue Memorial Union, West Lafayette, Indiana—Single $2.50; double $4.00; double with twin beds $5.00. All rooms with bath.

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CENTRAL PLANT BOARD AND NORTH CENTRAL STATES ENTOMOLOGISTS' CONFERENCE

Purdue University, Lafayette, Indiana

March 23-26, 1943

All Sessions in the Purdue Memorial Union

March 23-24—19th Annual Meeting of the Central Plant Board. For details write T. L. Aamodt, University Farm, St. Paul, Minnesota.

March 24—Extension Entomologists' Conference. For details write M. P. Jones, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C.

March 24—7:30 P. M.
Chinch Bug Conference.
a. Current Status of the Chinch Bug as Determined by the Fall Survey.
b. Survey Methods and Evaluation of Survey Data.
c. Barrier Materials and Their Availability.

March 25-26—**Twenty-Second Annual Conference of the North Central States Entomologists.**

March 25—9:00 A. M.
General Session and Insect Problems Directly Affecting the War Effort.

March 25—1:30 P. M.
1. Field Crop Insects.
2. Fruit and Vegetable Insects.
3. Miscellaneous Problems.

March 25—6:30 P. M
Banquet.

March 26—9:00 A. M.
General Session and Priorities.
Business Session.

March 26—1:30 P. M.
European Corn Borer.

GENERAL SESSION

Thursday, March 25, 9:00 A. M.

1. A Summary Report of the Sessions of the Central Plant Board—T. L. Aamodt.
2. A Summary Report of the Extension Entomologists' Session—M. P. Jones.
3. Report of Progress from the Committee of the A.A.E.E. on Coordination of Entomology with the War Effort—J. S. Houser.

INSECT PROBLEMS DIRECTLY AFFECTING THE WAR EFFORT

J. S. Houser, Chairman

1. What are the Specific Essential Differences Between War-Time and Peace-Time Entomological Programs?—P. N. Annand.
2. a. Entomological Training Expected by Those in Charge of War Work?
b. How is Insect Control Work Being Conducted in Army Camps and Among Our Troops in Foreign Countries?—F. C. Bishopp.
3. The Army Ration.—Lt. Col. Jesse H. White.
4. Present Status of Moth-Proofing Chemicals.—F. W. Fletcher.
5. Should Entomologists Now in Important Positions in Civilian Work Affecting Food Supplies, Enter the Army Service?—Major Joseph G. Wood.
6. Report of Mosquito Control in the Vicinity of Army Camps.—John Rowe.
7. The Work of the American Red Cross in Time of War.

FIELD CROP INSECTS

C. M. Packard, Chairman

Thursday, March 25, 1:30 P. M.

1. A Summary Report on the Chinch Bug Conference.—P. Luginbill.
2. Control of the Corn Earworm on Sweet Corn.—G. W. Barber
3. Progress in the Study of Corn Resistance to the Corn Earworm.—R. A. Blanchard, E. V. Walter.
4. Ecological Factors Affecting White Grub Populations.—C. L. Fluke.
5. The Sweet Clover Weevil.—J. A. Munro.
6. Meadow Plant Bug (Miris dolobratus) As a Pest of Blue Grass.—C. L. Fluke.
7. The Southwestern Corn Borer.—G. A. Dean.
8. Status of the Hessian Fly — Wheat Breeding Program.—R. M. Caldwell.

9. Is Winter Barley Sufficiently Injured by the Hessian Fly and is it Sufficiently Infested to Justify Waiting for the Fly-Free Seeding Dates?—W. P. Flint.

10. Why Should the Extension Service Stress Fly-Free Dates When Another Federal Agency Pays Hessian Fly Damage Following the Violation of this Principle?

11. What Are the Research Problems to be Developed Under Present Emergency Conditions for Cereal and Forage Crop Insects?

a. Hessian Fly.—W. B. Cartwright.
b. Grasshoppers.—Claude Wakeland.
c. Others.

FRUIT AND VEGETABLE INSECTS

L. F. Steiner, Chairman

Thursday, March 25, 1:30 P. M.

1. Codling Moth Orchard Surveys and Their Practical Value.—S. C. Chandler.

2. Some Recent Developments in Spray Equipment for Apple and Peach Orchard (Accompanied by Colored Movies).—B. F. Driggers.

3. How Shall the Research Entomologist Alter His Program with Fruit Insects to Fit War Conditions?—L. F. Steiner.

4. How Many Lead Arsenate Sprays Can Be Applied without Exceeding the Tolerance?—C. L. Burkholder.

5. What Should We Recommend for Codling Moth Control in Kentucky and the Southern Parts of Ohio, Indiana, Illinois, and Missouri?—

a. Kentucky.—W. A. Price.
b. Indiana.—G. E. Marshall.
c. Illinois.—S. C. Chandler.
d. Missouri.—L. Haseman.

6. What is Wrong With the Apple Industry in Southern Ohio, Indiana, and Illinois and Can Codling Moth Be Controlled?—B. F. Driggers.

7. What Can Be Done to Increase Parasite Effectiveness in Oriental Fruit Moth Control After Establishment Has Been Accomplished?—Alvah Peterson.

8. What is New in Control of the Oriental Fruit Moth?—Ray Hutson, G. E. Marshall.

9. What are the Best Control Measures for the Apple Maggot?—Ray Hutson.

10. Of What Economic Importance Is Tree Cricket Egg Deposition in Raspberry Canes?—S. C. Chandler.

11. What Are the Research Problems to Be Developed Under Present Emergency Conditions for Vegetable Crop Insects?—T. H. Parks.

12. How Can We Achieve Our Goals in Victory Garden Production?—G. E. Lehker.

MISCELLANEOUS PROBLEMS

C. L. Fluke, Chairman

Thursday, March 25, 1:30 P. M.

1. What Problems are Particularly Timely in Forest Insect and Stored Lumber Insect Research?—S. A. Graham.

2. Beekeeping Problems:

a. What Can We Do to Secure Increases in Honey and Beeswax Production?

b. Sugar Rationing and the Beekeeper.

c. Disease—Resistant Bees,—Present Status.—V. H. Milum.

3. What is the Optimum Procedure in the Control of Stored Grain Pests Under Farm Conditions.—H. H. Walkden.

4. What is New in Stored Grain Pest Control and What is Needed in Stored Grain Insect Research?—R. T. Cotton.

5. New Fumigants and Their Availability.—C. H. Richardson.

6. What is the Present Status and Future Possibilities of the Japanese Beetle in the Central West.—F. N. Wallace.

7. Safety of Fluorine Insecticides as Substitutes for Rotenone for Flea Beetles on Seedling Tomatoes and Diabrotica in Cucurbits?—R. H. Nelson, G. E. Gould.

8. Sabadilla, **Schoenocaulon** sp., as a Contact Insecticide.—T. C. Allen.

9. Aerosol Bombs: Are They Irritating? What is the Field for Their Use.—W. P. Flint.

10. Availability of Spray Materials for Florists and Possible Substitutes for Materials That May be Restricted to Food Crops.—C. C. Compton.

11. Control of the Powder Post Beetle.

GENERAL, PRIORITY CHEMICALS AND INSECTICIDE SUBSTITUTES

G. A. Dean, Chairman

Friday, March 26, 9:00 A. M.

1. What Can We Entomologists Do to Increase the Appreciation and Recognition of the Importance of Entomology?—C. L. Metcalf.

2. Entomological Problems Imposed by War Conditions.—P. N. Annand.

3. Soil Conservation Service as a Cooperative Agency in Insect Control.—W. W. Chase.

4. What is the Status of the Chemical Supplies Used in Insect Control? (A memorandum).—Warren H. Moyer.

5. What Materials Will Be Commercially or Experimentally Available This Year as Substitutes for War Scarce Insecticides.—S. A. Rohwer.

6. Revised W.P.B. Rotenone Order.—J. W. Apple.

7. A Summary of Progress in Insect Control in 1942.—C. H. Richardson.

8. In What Instances and to What Extent May Insecticides be Supplanted by Other Control Measures:

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c. Vegetable Insects.—N. F. Howard.
d. Fruit Insects.—B. A. Porter.
e. Household and Barracks Insects.—Chas. Denny.
f. General and Summary.—S. A. Rohwer.

9. Relation of Ox Warble Control to the War Effort.—F. C. Bishopp.

10. What Has Been Done in the Various States Represented in the Line of Ox Warble and Horse Bot Control Campaigns?—B. G. Berger, G. E. Lehker.

11. New Methods of Controlling Cockroaches.—S. Marcovitch, J. M. Hutzel, G. E. Gould.

12. Business Session.

EUROPEAN CORN BORER

C. J. Drake, Chairman

Friday Afternoon, March 26, 1:30 P. M.

1. Status of the European Corn Borer in the North Central States.—Paul Ulman.

2. Importance of the Second Generation of the Corn Borer.—A. M. Vance.

3. Plans and Results of the Regional Cooperative Committee on Corn Borer Research.—Director H. J. Reed.

4. Planting Date in Relation to Corn Borer Control:
a. Field Corn.—L. H. Patch, S. R. Miles, R. T. Everly.
b. Sweet Corn.—M. Schlosberg.

5. Progress Reports on Corn Borer Resistance:
a. Field Corn.—L. H. Patch, L. L. Huber, J. H. Bigger.
b. Sweet Corn.—M Schlosberg.

6. Breeding Program for Corn Borer Resistance as Viewed by the Plant Breeder.—R. O. Snelling.

7. What is Our Attitude Regarding Clean-Up for Corn Borer Control?—J. S. Houser, Ray Hutson, W. P. Flint, C. L. Fluke, J. J. Davis.

8. The Problem of Control of the European Corn Borer on Sweet Corn for Market and Canning Corn in the Midwest Area.—W. P. Flint, W. A. Baker.

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10. The Status of Corn Borer Parasites.—W. A. Baker.

11. Importance of Cooperation in Corn Borer Control and How It May Be Obtained.—G. E. Lehker.

12. Research Work in Progress and Needed.—W. P. Flint.

How Many Species Of Pests Enter Our Homes?

By **HARVEY L. SWEETMAN**, *Massachusetts State College*

A RECORD was made of the species of pests that gained access to and congregated about one home during 1942. All animals that were likely to be considered pests by many householders were included. The lack of data of this type had been emphasized in discussions on this subject at the Pest Control Operators' Conference held at Massachusetts State College in January, 1942. In those discussions it was suggested that every householder could anticipate visitations from 25 to 50 species annually. While I did not have accurate records to support my contention, the opinion was based on observations over a number of years from research and in control and eradication of household pests in private residences, public buildings, and commercial establishments.

This home is three miles from the Massachusetts State College campus and is about 400 feet from the nearest neighbor. The house was built in 1936 and has two floors and a full basement. All lumber used in the building, except that in the inside finish, was old and well seasoned as it was taken from buildings 50 to 100 years or more in age.

The surrounding environment may have had some influence on the type of pests and relative numbers of each, yet it is obvious that nearly all are common household pests of New England and are in the cities as well as rural communities.

The pests are listed according to food habits or habitat. This produces some overlapping and where this occurs the repeated names are enclosed in parentheses.

Fabric Pests

Ctenolepisma quadriseriata Pck.	Four-lined silverfish
Lepisma saccharina L.	Silverfish
Anthrenus verbasci L.	Varied carpet beetle
Anthrenus scrophulariae L.	Common carpet beetle
Attagenus piceus Oliv.	Black carpet beetle
Tineola biselliella Hum.	Webbing clothes moth

Food Pests

Tribolium confusum Duv.	Confused flour beetle
Tenebroides mauritanicus L.	Cadelle
Tenebrio molitor L.	Yellow mealworm
Trogoderma versicolor Creutz.	Larger cabinet beetle
(Anthrenus verbasci L.)	(Varied carpet beetle)
Tinea granella L.	European grain moth
Solenopsis molesta Say	Thief ant
Crematogaster lineolata Say	Shed-builder ant
Musca domestica L.	Housefly
Drosophila melanogaster Meig.	Common pomace fly
Drosophila sp.	Pomace fly

Bloodsucking Pests

Culicidae	Mosquitoes (2 species)
Stomoxys calcitrans L.	Stablefly

Wood Pests

Reticulitermes flavipes Koll.	Subterranean termite
Anobium? sp.	Death watch beetle

Book and Wallpaper Pests

(Ctenolepisma quadriseriata Pck.)	(Four-lined silverfish)
(Lepisma saccharina L.)	(Silverfish)
Liposcelius divinatorius Mull.	Common booklouse

Attic Pests

(Ctenolepisma quadriseriata Pck.)	(Four-lined silverfish)
Polistes pallipes Lep.	Wasp
Muscina pascuorum L.	A cluster fly

Basement Pests

Ceuthophilus sp.	Cave cricket
Anasa tristis DeG.	Squash bug
Psocidae	Booklouse
Chilopoda	Millipede
Isopoda	Sowbug
Phalangida	Harvestman

News From Washington

CHEMICAL ALLOCATION

Consumers of chemicals should inform their suppliers of end uses, the WPB chemicals division said recently. Many critical chemicals are scarce and wartime necessity demands using them solely for the most essential purposes.

PYRETHRUM PROCESSORS: The Director of Industry Advisory Committees, War Production Board, announced formation of the following industry advisory committee during the week ending January 30.

Government presiding officer — Warren H. Moyer.

Members: W. E. Dermody, Gulf Oil Corporation, Pittsburgh, Pa.; C. B. Gnadinger, McLaughlin Gormley King Co., Minneapolis, Minn.; L. P. Jones, McCormack & Co., Baltimore, Md.; Harold King, R. J. Prentiss & Co., New York, N. Y.; R. P. Neptune, Allaire-Woodward & Co., Peoria, Ill.; Harold Noble, S. B. Penick & Co., New York, N. Y.; J. B. Rosefield, Anfo Mfg. Co., Oakland, Calif.; H. F. Seeland, Stanco, Inc., Elizabeth, N. J.; J. C. Stirton, Standard Oil Co. of Calif., San Francisco, Calif.; R. B. Stoddard, Dodge & Olcott, New York, N. Y.; Dr. Alfred Wood, John Powell & Co., New York, N. Y.

'Standard Rat' Wanted

The Association of Scientific Workers appealed recently for a "standard rat." It said the rodents now available for research purposes vary too much and suggested a 15-year plan for breeding rats, mice and guinea pigs on a "standard" basis.

Pseudoscorpionida	Pseudoscorpion
Araneida	Spiders (10 species)

Miscellaneous Pests

Bryobia praetiosa	Clover mite
Collembola	Springtails
Chalybion cyaneum Dahlb.	Blue mud-dauber
Trypoxylon politum Say	Organ-pipe maker
Borboridae ?	"Dung" flies

Bird and Rodent Pests

Mus musculus L.	House mouse
Peromyscus leucopis Raf.	White-footed mouse
Chaetura pelagica L.	Chimney swift

The abundance of some of these pests resulted from peculiar circumstances in or about the home. The infestation of the webbing clothes moth was in a carpet sweeper, the larvae feeding on the brushes and lint, and was easily eliminated when found. The enormous number of fruit flies, whenever attractive odors were present, came from a neighboring orchard. The termites have not infested the house, but are very numerous in the soil in the yard and nearby. This is the natural population that maintains itself in the tree roots in the yard and in roots and stumps in the environs. The spiders are very numerous in the surroundings and enter from time to time, especially in the autumn. The flies of the family Borboridae occasionally appear in great abundance at night during or after gentle warm rains, probably coming from a swampy area nearby. The small flies, attracted by the lights, readily pass through a 16-mesh screen.

Forty-four of these infestations were of minor importance and required no especial attention (22 species) or were eradicated (22 species) by such simple methods as elimination of infested materials, killing isolated insects, and judicious use of a vacuum cleaner. Five of the species were sufficiently numerous and persistent to be considered as major infestations. These latter infestations were produced by the common silverfish, four-lined silverfish, webbing clothes moth, thief ant, and mice. The mice were eliminated by trapping and closing the point of entrance, the thief ant and clothes moth by poison applications, while the Thysanura have been permitted to remain temporarily as they are a source of supply for experimental specimens.

This record is probably a fair sample of the number of household and food pest species that enter or congregate about private dwellings annually in this part of the United States. How do they reach our homes? At least 42 of the pests listed above gained access through their own efforts and four were introduced in food, although adults of two of the latter gained entrance through their own efforts also. The means of entrance of five of the species, two producing major infestations, are unknown.

VINCENT SUPPAN, formerly with the Vogel-Ritt, Inc., of Allentown, Pa., which firm he left to return to college to complete his studies, after which he was inducted into the Army, was awarded his lieutenant's bar on January 21. Lt. Suppan is presently stationed with the Field Artillery at Fort Bragg, N. C.

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FUMIGANTS *in the control of insects attacking stored products*

By **M. D. FARRAR** *State Natural History Survey Division, Urbana, Ill.*

Editor's Note: Talk at Pest Control Operators' Conference, Purdue University, Lafayette, Indiana, January 6, 1943.

FIRST of importance in successful fumigation is to select the right chemical and use it correctly. The choice of the chemical for each job will necessarily depend on the properties of the chemical as a gas, its effect on the product treated, and, possibly, cost.

To list the dosage requirements, it would be necessary to include more determining factors than are shown in the table. The table is designed to provide a reference in the choice of the proper chemical. Only those chemicals readily available are shown. These chemicals may be expected to give good control of insects when applied in sufficient dosage.

The fumigation procedures are roughly divided into three groups:

First, space fumigation with light loads under conditions found in households, warehouses, food processing plants, and cereal mills.

Second, space fumigation with heavy loads, such as found in atmospheric vaults, railroad box cars, and warehouses.

Third, this procedure applies almost entirely to warehouses, elevators, elevator bins, commercial and farm storage of food stuffs where the treatment can be applied only to the top surface of the product.

The chemicals shown in this group, when applied on top of the grain surface, or in layers within deep bins, form heavier than air gases that penetrate downward into the product. The rate of penetration will vary with the product treated.

The temperature of a grain mass has an important bearing on the efficiency of the fumigant in destroying insect life. Using a normal dosage of chemicals, average grain temperatures ranging between 60 and 80 degrees Fahrenheit are satisfactory for routine grain fumigation. Grain with less than 60 degrees Fahrenheit of temperature will require more material. For bins filled with grain that is heating (grain averaging above 85 degrees Fahrenheit in a central column), one and one-half (1½) times the normal dosage is suggested. All treatments should be made by distributing the chemical uniformly over a level grain surface, in the form of a very coarse spray.

In bins containing not more than 3,000 bushels of grain, use the following normal dosage for each 1,000 bushels of grain in the bin:

Fumigant	Amt. per 1,000 bushels
Carbon bisulfide	3 gals.
Carbon tetrachloride, 4 parts—Carbon bisulfide, 1 part	6 gals.
Ethylene dichloride, 3 parts—Carbon tetrachloride, 1 part	6 gals.
Ethylene dichloride, 3 parts—Carbon tetrachloride, 1 parts—9 parts. Methyl brodie, 1 part	2 gals.
Chloropicrin, 1½ to 2½ lbs., and Carbon tetrachloride to make	1 gal.
"Ethide," 2½ lbs., and Carbon tetrachloride, 1 gal.	2½ lbs., 1 gal.

TABLE I

Control of Stored Products Insects by Fumigation

Fumigant	Toxicity to insects	Damage to contents	Degree of penetration	Holding gas within space	Ease of ventilation	Accident and human hazard*
Space Fumigation Where Load Is Light (Maximum 10% Contents)						
Hydrocyanic acid gas	Very high	None	Fair	Average	Good	High, no odor
Methyl bromide	Very high	May injure germination	Excellent	Difficult	Excellent	High, no odor
Carbon dioxide and insecticide	Very high	May injure germination	Excellent	Difficult	Excellent	High, no odor
Chloropicrin	Very high	May corrode iron	Fair-Good	Average	Difficult	Low, strong odor
Space Fumigation Where Load Is Very Heavy (Maximum 10-80% Contents)						
Hydrocyanic acid gas	Very high	None	May fail	Average	Good	High, no odor
Methyl bromide	Very high	May injure germination	Excellent	Difficult	Excellent	High, no odor
Carbon dioxide and insecticide	Very high	May injure germination	Excellent	Difficult	Excellent	High, no odor
Chloropicrin	Very high	May injure germination	May fail	Highly Adsorbed	Difficult	Low, strong odor
Grain Fumigation With Heavy Load (Maximum 100% Contents)						
Carbon bisulfide	Very high	None	Excellent	Average	Good	High fire hazard and explosive
Carbon tetrachloride, 4 parts Carbon bisulfide, 1 part	Moderate	None	Excellent	Average	Good	Low fire hazard and explosive
Ethylene dichloride, 3 parts Carbon tetrachloride, 1 part	Moderate to good	None	Excellent	Average	Good	Low fire hazard and explosive
Ethylene dichloride, 3 parts Carbon tetrachloride, 1 part Methyl bromide, 9 parts 1 part	Very high	May injure germination	Excellent	Average	Good	Low fire hazard and explosive
Chloropicrin-Carbon tetrachloride mixture	Very high	May injure germination	Excellent	Average	Good	Low fire hazard and explosive
"Ethide"-Carbon tetrachloride mixture	Good to high	?	Excellent	Average	Fair	Low fire hazard and explosive

* In applying all chemical fumigants listed in this table, workmen should wear an approved gas mask, equipped with the correct canister for the fumigant used. The gas mask should be worn both in applying and releasing the gas as a precaution against accident.

MDF*R
2/23/43

Recognition and Control of Beetles

(Continued from Page 14)

deathwatch beetle is common in certain parts of eastern North America but is not known to be important on the Pacific Coast. Only a few infestations have been noted in the West and these may have been of foreign origin.

The California deathwatch beetle [**Hadrobregmus gibbicollis** (Le Conte)] (fig. 4) is an elongate, subparallel brown to dark brown beetle about 4-6 mm. long. The antennae are 11-segmented, with the last three segments distinctly longer than preceding three segments. The pronotum is convex and distinctly narrower than the base of the wing covers. The striae of the wing covers are not deep, and the punctures are regular. It breeds in old, well-seasoned Douglas fir ("Oregon Pine") studs, joists and supporting timbers along the Pacific Coast. It is especially common in basement timbers of buildings 20 or more years old and is the most serious pest among the native powderpost beetles in the area which it occupies. It breeds year after year in supporting timbers, reducing the contents to powder while leaving surface intact, thus providing a dangerous hazard. The adults emerge through round holes nearly 1/8 inch in diameter and frequently fly to windows congregating on the sills. However, because the beetles work commonly in basements in unfinished wood, emergence holes and signs of infestation are not conspicuous, often obscure and inaccessible. Much serious damage attributed to termites should be credited to this species.

The eastern deathwatch beetle [**Hadrobregmus carinatus** (Say)] is an elongate, subparallel, reddish brown to dark brown beetle 3.5-6.5 mm. long. It differs from the western deathwatch beetle by having the antennae 10-segmented and the pronotum about as broad as the base of the wing covers. It is widely distributed in Eastern North America and breeds in both new and old wood. It has been recorded from ash and basswood flooring in Ohio and Michigan, maple and beech in Indiana, sills and floors in Conneticut, elm floor joists in Minnesota, etc.

The drugstore beetle [**Stegobium paniceum** (Linn.)] is an oblong, robust, reddish-brown, pubescent beetle from 2-4 mm. long. Its antennae have the last three segments very much elongated and about twice as wide as the preceding segments. The pronotum is convex and as wide as the base of the wing covers. The wing covers are finely striate with the striae finely punctate. It is a cosmopolitan species and breeds in a wide variety of stored food and drug products as well as other dry plant materials. It has been recently recorded as boring in bamboo Mah Jong playing pieces (Linsley, 1942b) and thin wooden forms (Linsley, 1942c). Although very important as a pest of stored products the drugstore beetle is apparently only an incidental wood-borer.

The true powderpost beetles belong to the genus **Lyctus** of the family Lyctidae and are narrowed and flatter than the deathwatch and furniture beetles. The head is not covered by a hood-like prothorax and the end of the antennae bears a club composed of two, rather than three, segments. The beetles confine their attacks to hardwoods and feed only in sapwood areas. The eggs are deposited in pores of the wood and therefore susceptibility of wood to attack depends upon the relation between the size of the pores and the diameter of the egg

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laying apparatus (ovipositor). The eggs are long and slender with a thread-like strand at one end. They usually hatch in from one to two weeks and the young larvae bore with the grain of the wood. They require a starchy diet and therefore are rarely found in very old wood. As they feed they leave behind a fine, flour-like boring dust, unlike the pellets of the deathwatch beetles. They usually complete their development in one or two years and work up toward the surface to pupate. A month or so later they emerge through small round holes about the diameter of the head of a pin. Because the eggs are normally laid in the pores of cross sectioned wood and therefore the primary infestation usually occurs in lumber yards or drying sheds and continues after the wood has been incorporated into a structure or made up into furniture. The more important species follow:

The Old World powderpost beetle [**Lyctus brunneus** Stephens] is reddish brown, about 3-5 mm. long. The pronotum is broader than long, wider in front than behind and shallowly depressed at the middle. The wing covers have depressed hairs rather evenly distributed over the surface. The species is nearly cosmopolitan in distribution but is most abundant and injurious in tropical and subtropical regions. It breeds in a variety of seasoned hardwoods and also dry herbaceous roots and is commonly introduced into west coast cities in imported Oriental bamboo furniture and utensils.

The European powderpost beetle [**Lyctus linearis** Goeze] is a brown or reddish-brown beetle from 2.5-5 mm. long. The pronotum is about as long as broad, nearly square, distinctly narrower than the wing covers, with a deep, elongate-elyptical impression at middle. The wing covers have the punctures and depressed hairs arranged in longitudinal rows. The species is distributed in the temperate regions of the world, probably coming originally from Europe. It is common in eastern North America in commercial hardwood products, especially seasoned hickory, oak, walnut and ash, but is apparently not well established on the Pacific Coast.

The southern powderpost beetle [**Lyctus planicollis** Lec.] is a black species from 2.5-5.5 mm. long. The pronotum is about as long as broad, wider anteriorly than the base of the wing covers, with a broad, shallow median impression. The wing covers have the punctures arranged in double rows. It is a common and important species, especially in the South.

The western powderpost beetle [**Lyctus cavicollis** Lec.] (fig. 5B) is reddish brown and from 3.5-4.5 mm. in length. The pronotum is about as long as broad and narrower in front than the base of the wing covers, with a broad, oval impression in the middle. The wing covers have a double row of punctures. It is a common species on the Pacific Coast, frequently gaining access to houses in oak firewood.

The small powderpost beetle [**Lyctus parallelopipedus** Melsh.] is reddish to dark brown and varies from 2-4 mm. in length. The pronotum narrows behind and has a very shallow depression in the middle. The wing covers are rather smooth and irregularly covered with dense yellow pubescence. It is most common in the southern states.

The false powderpost beetles belong to the family Bostrichidae. They are usually larger than the true powderpost beetles, more cylindrical, with a more convex thorax and a 3-segmented, antennal club. They attack a wide variety of woods and frequently tunnel into the surface in order to lay their eggs. The larvae usually bore with the grain or wind irregularly through the wood, leaving behind a rather coarse powder which is cemented into a compact mass and will not readily shake loose like the boring dust of powderpost beetles or the pellets of deathwatch beetles. Otherwise their habits are similar.

The lead-cable borer [**Scobicia declivis** (Lec.)] (fig. 5C) is a cylindrical, brown or reddish-brown beetle with reddish mouthparts, legs, and antennae. It is about 5 or 6 mm. long, with 8-segmented antennae and a hood-like pronotum which conceals most of the head from above. The wing covers have deep linear punctures. The species is common on the Pacific Coast, especially in California. The females usually burrow deeply to lay eggs. The larvae honeycomb the wood, boring mainly with the grain, and their development is normally completed in one year. The adults appear to be greatly stimulated by heat and sometimes bore into lead or asphalt roofing materials, making a hole about 1/8 inch in diameter. Although unimportant as a pest of structural timber it is occasionally injurious to newly painted houses, telephone cables, roofs, etc.

The black polycaon [**Polycaon stoutii** (Lec.)] (fig. 6A) is a cylindrical, coal black beetle from 11-22 mm. long. Its head is prominent and exerted, the antennae 11-segmented, the pronotum oval, not hood-like and without tubercles. Unlike the lead-cable borer, the wing covers have no apical declivity and the punctures are fine. It is common on the Pacific Coast, breeding primarily in non-coniferous soft woods and is especially destructive to inner layers and fillers of panels, plywood, etc. The larvae excavate winding burrows running mainly with the grain. The primary infestation occurs in warehouses and drying yards. The larvae require from one to several years to complete development. When ready to emerge they burrow out by most direct route available, passing readily through hardwoods, veneer, or even lead sheets to escape, leaving an emergence hole about 1/4 inch in diameter. The black polycaon is primarily important because of the marring effect of its emergence holes in finished furniture, panels and other wood products. It is not known to infest finished products after manufacture nor to re-infest materials in which it has previously been breeding. Emergence, even after long periods of time, is generally regarded as evidence that the product was infested before manufacture.

Note of Caution

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CONTROL

The most satisfactory methods of control for most of these beetles are preventative. Since sapwood is required by powderpost beetles and generally preferred by other species, heartwood should be used wherever possible. Proper methods of sanitation and handling in yards and warehouses will do much to prevent infestation. Valuable materials may be treated with boiled linseed oil. Sapwood portions of furniture, cabinets, etc. should be varnished or waxed to prevent oviposition. Kiln drying at 180° F. or steam treating for 1½ hours at 130° F. will destroy any insects already in the wood.

Control of the beetles in furniture, flooring or structural timbers already in place may be accomplished in a variety of ways. The most effective methods are treatment by heat or fumigation. When it can be used safely, especially on small articles, heat treatment is the quickest and surest method. Heating may be done in an oven or hot air chamber and need only be continued long enough to bring

the inner wood to a temperature of about 131° F. This can be accomplished for inch thick wood in about ¾ hour at 175-180° F.

Fumigation in air-tight chambers is also an effective method under most conditions. The usual fumigants used for this purpose are cyanide, ethylene-dichloride, carbon bisulfide, etc.

In the average household, the least objectionable and most convenient method of control is by use of liquids. The liquids may be applied with a brush, washed on the surface, or injected with a syringe directly into emergence holes. Satisfactory materials for this purpose are white kerosene, benzene, a mixture of turpentine and linseed oil, carbon tetrachloride, orthodichlorobenzene, etc. Applications should be as thorough as possible and should be repeated two or three times at daily intervals. In order to test the success of the treatment old emergence holes should be filled with plastic wood, putty, wax or some other filler. This will enable the ready recognition of any new emergence holes which might appear and indicate the need for further treatment. Fillers also prevent other beetles from using the old emergence holes for laying their eggs.

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Toxicity of Acrylonitrile, Chloroacetonitrile, Ethylene Dichloride and Other Fumigants to the Confused Flour Beetle

(Continued from Page 17)

conveniently measured by use of a small hypodermic syringe attached to a micropipette.

Acrylonitrile and chloroacetonitrile were the most toxic chemicals and appear worth further study as fumigants. They were also very toxic to the bedbug, **Cimex lectularius** L. Other chemicals tested are listed by groups approximately in the order of decreasing toxicity, as follows: (1) Methyl bromide, 1-1-dichloro-1-nitropropane, and 1-1-dichloro-1-nitroethane; (2) methyl allyl chloride, methyl allyl bromide, and ethylene oxide; (3) carbon disulfide; and (4) ethyl bromide.

Ethylene dichloride was found to have a delayed killing action, which increased mortality considerably over a period of about 20 days after fumigation. A non-inflammable mixture with carbon tetrachloride (3:1 by volume) also showed a latent effect,

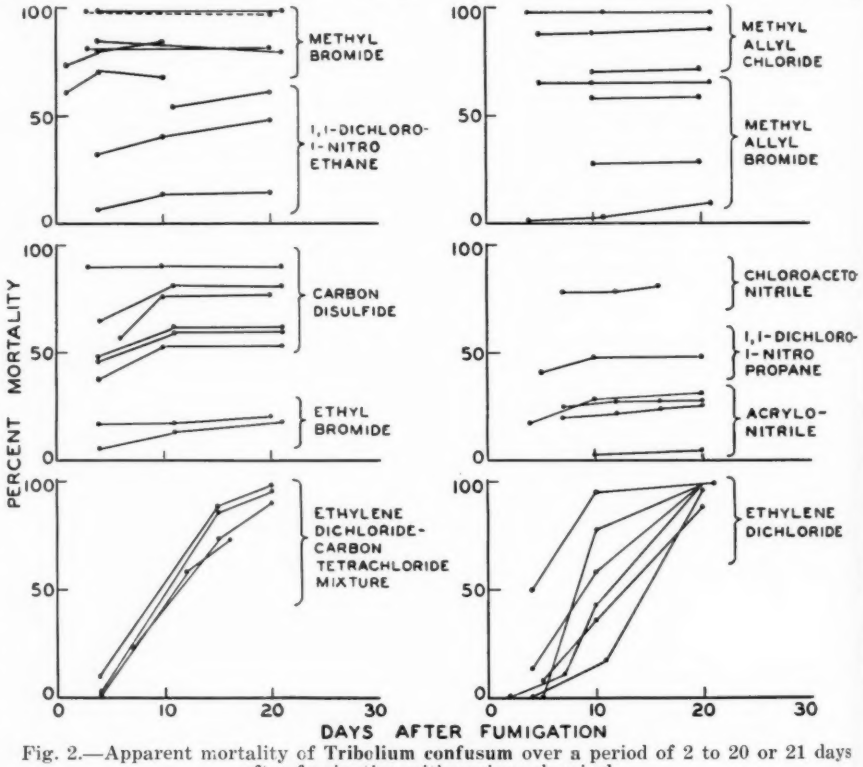

Fig. 2.—Apparent mortality of **Tribolium confusum** over a period of 2 to 20 or 21 days after fumigation with various chemicals.

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but the carbon tetrachloride added little or nothing to toxicity. Judging only from the mortality produced after 20 days, ethylene dichloride is not far below methyl bromide in the toxicity scale. However, beetles fumigated with these low concentrations of ethylene dichloride may lay viable eggs before death, and the dosages must be increased to prevent egg laying.—6-15-42.

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Entomological Literature

REPORT OF THE CHIEF OF THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, 1942

U. S. D. A., Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Washington, D. C., September 10, 1942. For sale by Superintendent of Documents, United States Government Printing Office, Washington, D. C., giving title, issuing office, and classification number. Do not send stamps.

PUBLICATIONS

Publications listed below may be ordered from the Superintendent of Documents, United States Government Printing Office, Washington, D. C., giving title, issuing office, and classification number. Do not send stamps.

House Ants. 1937. 8 p.il. (Agriculture Leaflet 147.) 5c—A 1.35:147 Injury to buildings by termites. Revised 1936. 8 p.il. (Agriculture Leaflet 101.) 5c—A 1.35:101. Supersedes Leaflet No. 31. Preventing damage by tendent of Documents, Washington, D. C. Price 10 cents.
termites or white ants. Rev. 1939. 22 p.il. (Farmers' Bulletin 1472.) 5c—A 1.9:1472. Red Harvester ant and how to subdue it. (Farmers' Bulletin 1668) 5c—A 1.9:1668.

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Cockroaches and their control. Rev. 1939. 6 p.il. (Agriculture Leaflet 144) 5c—A 1.35:144.

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Pyrethrum. Relative insecticidal value of commercial grades of pyrethrum. 1930. 10 p. (Agriculture Technical Bulletin 198.) 5c —A 1.36:198.

Vermin. Modern steam laundry processes as means of destroying vermin. (Public Health Reprint 649) 5c—T 27.6/2:649.

House fly control. 1939. 6 p.il. (Agriculture Leaflet 182.) 5c—A 1.35:182.

SANITATION MANUAL FOR LAND AND AIR CONVEYANCES OPERATING IN INTERSTATE TRAFFIC

A Manual for the Sanitary Control of Water Supplies, Milk and Milk Products, Eating and Drinking Facilities, Excreta Disposal, Garbage and Refuse Disposal, and other Items of Sanitation Concerned With Land and Air Conveyances (Railroad Cars, Motor Vehicles, and Airplanes) Engaged in Interstate Traffic.

This manual is designed to provide public health agencies and carriers with the necessary information upon which to base their procedures. It is requisite that each facility or procedure coming under consideration should be carefully examined with reference to its adequacy. The scope of such examination and application will vary according to the circumstances incident to the current war emergency existing in each individual case and cannot be fully specified. In general the facilities and procedures should, however, be in accordance with this sanitation manual.

This manual will be subject to periodic review and revision when indicated to be desirable for incorporation of such changes as actual experience may suggest.

Public Health Reports, Vol. 58, January 29, 1943, for sale by Superintendent of Documents, Washington, D. C. Price 5c. (No Stamps.)

Venezuelans Fear Mosquitos

CARACAS, Venezuela—The Venezuelan village of Irapa is reported to have ordered a blackout against an invasion of "huge hairy mosquitoes" from near-by swamps. The authorities decided to continue the blackout until the attackers disappear. Their bites were said to cause fever.

—*N. Y. Times.*

LOCAL ORGANIZATION NEWS

Connecticut Pest Control Association

Connecticut Pest Control Association meets in November, 1942, at Hartford; also at Connecticut Experimental Station, New Haven, February 2, 1943.

At the annual meeting of the CPCA, in November, the following officers were re-elected to office for the coming year:

President—Fred Haas, Aetna Exterminating Co.

Vice-President — Walker Heap, Abbot Pest Control Co.

Secretary and Treasurer—O. N. Anderson, Berg Exterminating Co.

Mr. Fred Haas was host at a dinner for the group.

The Association is very proud—and who wouldn't be—of the fact that F. E. Bohman, one of its members, was elected to serve as president of the NPCA at Pittsburgh. Mr. Bohman spoke on the importance of National Membership and on the highlights of the Convention.

In order to conserve gasoline, it was voted to hold future meetings every other month.

Though the membership is not very large, the members are very active. As a result an almost 100 per cent attendance was recorded. Their names follow:

Mr. Bureau	Mr. Bohman
Mr. Haas	Mr. Heap
Mr. Turner	Mr. Ledwith
Mr. Putinski	Mr. Mason
Mr. Duncan	Mr. Anderson

The February meeting in New Haven was devoted to matters of business and an interesting and instructive talk by Dr. Roger B. Friend of the Connecticut Experimental Station. The meeting, which adjourned at 6:30 p. m., was followed by a dinner and entertainment.

Members present:

Mr. Mason	Mr. Putinski
Mr. Duncan	Mr. Bohman
Mr. Bureau	Mr. Haas
Mr. Dietz	Mr. Ledwith
Mr. Heap	Mr. Anderson

Report: O. N. Anderson, Secretary.

California Pest Control Association

With subjects of technical interest predominating the highly successful Sixth Pacific Coast Pest Control Conference, the annual meeting of the California Pest Control Association, which followed in close proximity thereto, at the Hotel Leamington, Oakland, Calif., February 6th, 1943, was turned over to matters of business moment and the election of A. T. Parsons as president, and C. C. Delk as vice-president for the coming term. R. E. Hackley was re-elected secretary and treasurer, at the regular meeting of the board following.

After a discussion of the pros and cons of means to handle business affairs of the Conference, it was voted to ask the Conference faculty of the University of California to appoint a Conference Committee, with funds on hand from previous conferences to be turned over to the new committee when formed.

Informal showing of hands indicated unanimous disapproval of free termite inspections; though, in fact, there were supporters of the practice on the part of some members of the Industry.

It was voted not to promote new legislation. It was agreed, however, that attention would be paid to potentially harmful legislation.

Motion to disincorporate in favor of the newly formed association was lost.

Report submitted by Robert E. Hackley, Secretary and Treasurer.

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WHAT'S NEW IN PEST CONTROL-PERSONALS

Hazel, Virgil and Hainds Elliott Laird of Stillwater, Okla., announce the happy invasion of their household by a parachute bearing light but precious cargo (10½ lbs.) which arrived as scheduled Friday, January 19, 1943, at 9 a. m., and which they have named Pamela Victory.

Daddy hit the ceiling high,
Mom's visibility is zero as yet,
Hainds Elliott was dumbfounded,
—The invader landed very wet.

Virgil Laird operates the A & M Termite Co. Congratulations.

SAVING TOOLS: Priorities being what they are, PCOs had best make their metal tools last for the duration. The following "recipe," furnished by Mrs. Seth Harmon of Doylestown, Pa., as a means of removing the most stubborn rust from metal surfaces is very effective, according to an item in the "Times."

Ask the druggist to make a paste of the following ingredients:

1 *part glycerine*
2 *parts oxalic acid*
2 *parts phosphoric acid*
5 *parts ground silica*

Apply the paste with brush or spatula to the rust spots; let remain in a warm place for half an hour; then wash off rust with the paste and apply rust preventive.

Wear gloves when using paste.

THE FIFTH EDITION
of
"ENTOMA"
IS NOW BEING PREPARED
THIS DIRECTORY OF PLANT PEST CONTROL LISTING

Insecticides, Fungicides and Seed Disinfectants and Chemicals used in their manufacture, Insecticide and Fungicide Manufacturers, Insecticide and Fungicide Trade Names, Insecticide Machinery, Entomological Supplies and Equipment, Biological Testing Laboratories, Consulting Entomologists, Pest Control Operators, etc., is being revised and will be published early in 1943 by

The Eastern Branch of the American Association of Economic Entomologists

EDITED BY
CLYDE C. HAMILTON
Department of Entomology,
New Jersey Agricultural Experiment Station,
New Brunswick, New Jersey.

PENNSYLVANIA REFINING CO. ELECTS BECK.

Paul R. Beck has been elected president of Pennsylvania Refining Company, Butler, Pa., it was announced recently. Also newly elected is John Beck, Jr., as secretary and treasurer.

Walter W. Beck, M. H. Hindman and Dale T. Glenn continue as vice-presidents, Mr. Glenn being in charge of the Ohio division.

Pennsylvania Refining Company, with refineries at Kaerns City, Pa., and Titusville, Pa., are makers of petroleum products, including white oils, petrolatums, insecticide waxes, industrial and motor lubricants and bases, naphthas, petroleum sulphonates, greases, fuel oils, and other petroleum products.

COMPLETEX SALES COMPANY, 132 West 43rd Street, N. Y. C., has been appointed eastern representative for Associated Chemists, Inc., Chicago, Ill. J. Van Velsor Smith will be in charge of sales.

Psychological: Not a very seasonable item, but it's been found that if fishing nets are attached to open doors and windows, they have a tendency to keep out flies, even though the flies could easily penetrate the large mesh nets.

—*N. Y. Post.*

RODENT CONTROL as a public health measure, according to Public Health Reports, is an outgrowth of campaigns for reduction and eventual eradication of plague and endemic typhus fever. Only 12 states report official action leading to rodent control, and among these the methods are variant. In several jurisdictions demonstration projects have been conducted to determine the relative effectiveness of different rodent extermination measures. To a large extent state agencies function in a promotional, educational, or advisory capacity. Members of the state staff make studies in individual communities and on the basis of their findings help organize

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TULIPLAND: Agriculture in Holland, informs the New York Times, is on the verge of ruin from the ravages of insect pests and the lack of insecticides. Close behind the Nazi conqueror come his little brothers, the consuming worm, the devouring beetle.

SPECIFIC ADVERTISING: Which of the following two book titles do you think would sell the greater number of volumes: THE ART OF COURTSHIP, which is general, or THE ART OF KISSING, which is more specific? Actual records show the former sold 17,500 copies; the latter 60,500 copies. Dr. George W. Crane, well-known psychologist and newspaper columnist, believes disparity in sales figures was occasioned by fact that specific words produce action quicker than general terms. It may seem like a far cry from the sale of a book on the gentle art of kissing to the sale of pest control services, but the principle of being specific rather than general remains.

WATCH OUT FOR COMPOUNDS, warns Better Business Bureau, of Los Angeles, that are offered with the statement that they will "increase the length of life of automobile tires". Many of them are essentially water glass which has been used for years by tire manufacturers as a label adhesive, but has never been given credit for ability to make tires last longer.

We have seen no factual evidence yet which would seem to justify a longer wear claim for any of them It seems improbable that compounds which must be applied to the surface of a tire could make it last longer. Tests conducted elsewhere indicate that some of these compounds may actually tend to decrease the anticipated life of tires.

These statements pertain only to those compounds which are sold for use on tires in actual service—not compounds for application to tires in dead storage.

GAS SAVER: "This device will make your car run half again as far on each gallon of gasoline." Thus goes the current song of the street hawker and the racketeer promoter.

The song isn't new, but the chorus is larger. Listeners are apt to be more interested because of gas rationing.

The National Bureau of Standards of the United States Department of Commerce has investigated many of these gadgets and has yet to find one that will afford any greater service than could be rendered by the proper adjustment of your carburetor. Don't let a trick demonstration fool you.

—Better Business Bureau, Los Angeles.

Steel Drug Substitutes—In view of the shortage of steel drums, satisfactory substitutes developed include fiber drums, pulpboard kegs, slack barrels, glass bottles, jars and carboys and an asphalt-lined paper bag. Do not take this to mean that any less can be exercised in returning any steel drums on deposit or becoming careless with regard to equipment in your "shops."

MOTHPROOFING, operation of restaurants, skating rinks, etc., are included in the activities to which Chevrolet car dealers have turned for revenue to keep their establishments going and their personnel intact, it was disclosed recently in a booklet prepared by the Chevrolet Division of General Motors Corp., entitled "What Chevrolet Dealers Are Doing"

INSECTICIDE—A possible substitute for rotenone, essential insecticide ingredient now practically unavailable, exists, according to "Inside News", in the ground seeds of the yam bean, a tuber-like root grown in some Central and South American countries. Tests against cabbage worms, codling moth larvae, aphis, etc., showed results in some cases equal to the control provided by rotenone.

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Please note, however, that you must request each booklet on a separate letterhead though they may all be mailed in one envelope addressed to Pests, 126 Lexington Avenue, New York City, N. Y.

DEODORANT

Catalog includes price data, etc., on deodorant which it is felt can neutralize and deodorize such toxic agents as Thanite, Lethane 384 Special, Velsicol, etc. Also contains data on perfume oils for sprays made with pyrethrum and kerosene.
WRITE PESTS—Magnus.

PIGEON-PROOFING

Folder describes pigeon-proofing invention which manufacturer claims will completely and decisively eliminate the pigeon nuisance. In use by real estate companies, churches, government buildings, etc.
WRITE—PESTS—Stanley.

ROACH POWDER

Free, 1-lb. sample of roach powder which, it is claimed, is fast-acting.
WRITE—PESTS—Completex.

FILM OF VALUE TO PCO

Circular describes a vivid action film of greatest value to every PCO and opportunities it affords PCO to build good will and better public relations.
WRITE PESTS—WIL-KIL.

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Replies to advertisements where box number only is indicated should be addressed c/o PESTS, 512 E. 14th St., Kansas City, Mo., giving box number as well.

FOR SALE—A neat termite control business, so arranged, as no rent to pay, in heart of termite belt—Texas. If capable of doing roach and rat work also will have all can do. Want to retire and take life easy. Here is real opportunity for worker. Write—H. J. Scott, 1034 North Alamo St., San Antonio, Texas.

Brooklyn Girl Drinks Insecticide Poison By Error, Dies

Having an abdominal pain, Miss Kathryn Karfli, 20, a few hours before she was to have been married to an Army sergeant, mistook a container of sodium fluoride for bicarbonate of soda in the bathroom of her home, dissolved a teaspoonful in a glass of water and drank it, according to Brooklyn police. Miss Karfli, who lived at 2825 West Twenty-third Street, was rushed to the Coney Island Hospital, Brooklyn, where she died early the next morning.

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Chemical Formulary, Volume V

It seems unbelievable that despite the previous publication of four previous volumes of the CHEMICAL FORMULARY, it should have been possible to collect enough new and different tested formulae—literally thousands of them—for a fifth book. The latest edition, like its predecessors does not duplicate a single formula that was in any of the previous volumes.

The formulas are those used in commercial concerns and have been collected through the efforts of a board of editors of 45 outstanding chemists. These editors, most of whom are connected with commercial firms, experiment stations or American colleges and universities, add considerable authority to the book.

The ground covered in this volume is more comprehensive than that of any previous one and the editor has done an excellent job in this compilation. In a ready reference and brief form he has placed before the layman as well as before the specialist, much information that might otherwise necessitate a great deal of time to ferret out.

The book is not one of formulas alone, but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. The fact that many practicing chemists engaged in one field of work are not familiar with the formulas in another field, and that much study and practice must go into compiling unfamiliar formulas makes this volume a ready source book of information.

Of special interest to the readers of this journal would be the chapter devoted to FARM AND GARDEN SPECIALTIES. In addition to these subjects the following are discussed in great detail: ADHESIVES, BEVERAGES, COSMETICS AND DRUGS, EMULSIONS AND DISPERSIONS, TEXTILES, FIBRE, SOAPS, CLEANERS, FOOD, INKS, LEATHER, SKINS, FURS, LUBRICANTS, OILS, FATS, MATERIALS OF CONSTRUCTION, METAL AND METAL TREATMENT, PAINTS, ENAMELS, VARNISHES, LACQUERS, PAPER, PHOTOGRAPHY, POLISHES, PYRO-TECHNIQUES AND EXPLOSIVES, RUBBER, RESINS, PLASTICS, WAXES, MISCELLANEOUS.

Volume V does not supersede but adds to the information given in the four preceding volumes of the set and we urge every reader to possess the complete series and to keep adding each new volume as it is available. Price $6.00.

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